Marking Scheme

Strictly Confidential

(For internal and restricted use only)

Senior Secondary School Examination, 2025

SUBJECT NAME INFORMATICS PRACTICES (Set 4 Q.P. CODE 90)

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 the 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 News Paper/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-X, while evaluating two competency-based questions, please try to understand the given answer and even if the reply is not from the 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 answer CROSS 'X" be marked. Evaluators will not put right (/)while evaluating which gives an impression that the 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, the 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 **70 marks** as given in Question Paper 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 the 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 answers.) ● Half or a part of the 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 a 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
INFORMATICS PRACTICES

Max. Marks: 70

General Instructions :

(i) *Please check this question paper contains **37** questions.*

(ii) ***All** questions are compulsory. However, internal choices have been provided in some questions. Attempt only one of the choices in such questions.*

(iii) *The paper is divided into 5 sections - A, B, C, D and E.*

(iv) ***Section A** consists of **21** questions (**1** to **21**). Each question carries **1** mark.*

(v) ***Section B** consists of **7** questions (**22** to **28**). Each question carries **2** marks.*

(vi) ***Section C** consists of **4** questions (**29** to **32**). Each question carries **3** marks.*

(vii) ***Section D** consists of **2** case study type questions (**33** & **34**). Each question carries **4** marks.*

(viii) ***Section E** consists of **3** questions (**35** to **37**). Each question carries **5** marks.*

(ix) ***All** programming questions are to be answered using Python language only.*

(x) *In case of MCQs, text of the correct answer should also be written.*

Special Note: Questions (except the code) correctly answered in Hindi language as per the following Marking Scheme are to be accepted.

<table>
<tr><td></td><td colspan="4">SECTION A</td><td></td></tr>
<tr><td>1.</td><td colspan="4">State whether the following statement is True or False:
In Python, we cannot create an empty DataFrame</td><td>1</td></tr>
<tr><td>Ans</td><td colspan="4">False</td><td></td></tr>
<tr><td></td><td colspan="4">(1 Mark for writing the correct answer)</td><td></td></tr>
<tr><td>2.</td><td colspan="4">What will be the output of the following SQL command?
SELECT MONTHNAME('2024-08-02');
(A) 08 (B) 02
(C) February (D) August</td><td>1</td></tr>
<tr><td>Ans</td><td colspan="4">(D) August</td><td></td></tr>
<tr><td></td><td colspan="4">(1 Mark for writing the correct answer)</td><td></td></tr>
<tr><td>3.</td><td colspan="4">Temporary data files stored by websites in our computer can be used to track our online activities and also to personalize browsing experience. These files are known as :
(A) Plug-ins (B) Add-ons
(C) Cookies (D) Bookmarks</td><td>1</td></tr>
<tr><td>Ans</td><td colspan="4">(C) Cookies</td><td></td></tr>
<tr><td></td><td colspan="4">(1 Mark for writing the correct answer)</td><td></td></tr>
<tr><td>4.</td><td colspan="4">Which of the following is not an aggregate function in SQL?
(A) COUNT(*) (B) MIN()
(C) LEFT() (D) AVG()</td><td>1</td></tr>
</table>

Ans	(C) **`LEFT()`**	
	(1 Mark for writing the correct answer)	
5.	Raheem created a unique computer software and wants to protect his creation from being copied or used without his permission. He is considering to apply for legal protection. Which type of intellectual property protection should Raheem apply for, to safeguard his software ? (A) Copyright (B) Plagiarism (C) Trademark (D) Lease	1
Ans	(A) Copyright	
	(1 Mark for writing the correct answer)	
6.	What is the default index type for a Pandas Series if not explicitly specified ? (A) String (B) List (C) Numeric (D) Boolean	1
Ans	(C) Numeric	
	(1 Mark for writing the correct answer)	
7.	In Python which function of **`matplotlib`** library is used to save a plot ? (A) **`save()`** (B) **`saveplot()`** (C) **`export()`** (D) **`savefig()`**	1
Ans	(D) **`savefig()`**	
	(1 Mark for writing the correct answer)	
8.	State whether the following statement is True or False : The **`MOD()`** function in SQL returns the quotient of division operation between two numbers.	1
Ans	False	
	(1 Mark for writing the correct answer)	
9.	Which of the following data structure is used for storing one-dimensional labelled data in Python Pandas ? (A) Integer (B) Dictionary (C) Series (D) DataFrame	1
Ans	(C) Series	
	(1 Mark for writing the correct answer)	
10.	Priya received an email that appeared to be from her bank, asking her to update her account information by clicking on a link. She clicked the link to enter her details, but immediately after, some amount was debited from her account. What type of cybercrime did Priya fall victim to ?	1

	(A) Cyber stalking	(B) Phishing	
	(C) Fishing	(D) Cyber bullying	
Ans	(B) Phishing		
	(1 Mark for writing the correct answer)		
11.	Which SQL function calculates $\mathbf{a^b}$? (A) **MOD()** (B) **POWER()** (C) **RAISE()** (D) **ROUND()**		1
Ans	(B) **POWER()**		
	(1 Mark for writing the correct answer)		
12.	Which protocol is used while communicating through video calls on the Internet ? (A) Video Over Internet Protocol (B) Voice Over Internet Protocol (C) Internet Protocol (D) Video Audio Over Internet Protocol		1
Ans	(B) Voice Over Internet Protocol		
	(1 Mark for writing the correct answer)		
13.	Which of the following Python statements will be used to select a specific element having index as **points**, from a Pandas Series named **ser** ? (A) **ser.element(points)** (B) **ser.select(points)** (C) **ser[points]** (D) **ser.show(points)**		1
Ans	(C) **ser[points]**		
	(1 Mark for writing the correct answer)		
14.	Excessive screen time and poor posture can lead to : (A) Faster Internet Speeds (B) Eye strain and other health issues (C) Better vision and bone density (D) Improved physical health		1
Ans	(B) Eye strain and other health issues		
	(1 Mark for writing the correct answer)		
15.	Which of the following libraries defines an ndarray in Python ? (A) **pandas** (B) **numpy** (C) **matplotlib** (D) **scipy**		1
Ans	(B) **numpy**		
	(1 Mark for writing the correct answer)		
16.	With respect to SQL, match the function given in column-II with categories given		1

in column-I:

	I		II
(i)	Math function	(a)	`COUNT()`
(ii)	Aggregate function	(b)	`ROUND()`
(iii)	Date function	(c)	`RIGHT()`
(iv)	Text function	(d)	`YEAR()`

Options :

(A) (i)-(c), (ii)-(d), (iii)-(a), (iv)-(b)
(B) (i)-(b), (ii)-(a), (iii)-(d), (iv)-(c)
(C) (i)-(d), (ii)-(b), (iii)-(a), (iv)-(c)
(D) (i)-(b), (ii)-(c), (iii)-(d), (iv)-(a)

Ans (B) (i)-(b), (ii)-(a), (iii)-(d), (iv)-(c)

(1 Mark for writing the correct answer)

17. Which of the following Python statements is used to change a column label in a DataFrame, **`df`** ? 1

(A) `df = df.rename({old_name : new_name}, axis='columns')`
(B) `df = df.rename(old_name, new_name), axis='columns'`
(C) `df = df.change_name(old_name, new_name, axis='bar')`
(D) `df = df.update({old_name : new_name}, axis='bar')`

Ans (A) `df = df.rename({old_name : new_name}, axis='columns')`

(1 Mark for writing the correct answer)

18. In Python Pandas, **`DataFrame.`** _____ **`[]`** is used for label indexing with DataFrames. 1

(A)	`label`	(B)	`index`
(C)	`labindex`	(D)	`loc`

Ans (D) `loc`

(1 Mark for writing the correct answer)

19. Every web page on the Internet has a unique address. This address is known as : 1

(A)	Domain Name	(B)	Protocol
(C)	Uniform Resource Locater	(D)	Network Topology

Ans (C) Uniform Resource Locater

(1 Mark for writing the correct answer)

Q. 20 and Q. 21 are Assertion (A) and Reason (R) type questions. Choose the correct option as :

(A) Both Assertion (A) and Reason (R) are True and Reason (R) is the

<table>
<tr><td></td><td>correct explanation for Assertion (A).
(B) Both Assertion (A) and Reason (R) are True and Reason (R) is not the correct explanation for Assertion (A).
(C) Assertion (A) is True and Reason (R) is False.
(D) Assertion (A) is False, but Reason (R) is True.</td><td></td></tr>
<tr><td>20.</td><td>Assertion (A) : The <code>drop()</code> method in Pandas can be used to delete rows and columns from a DataFrame.
Reason (R) : The axis parameter in the <code>drop()</code> method specifies whether to delete rows <code>(axis=0)</code> or columns <code>(axis=1)</code>.</td><td>1</td></tr>
<tr><td>Ans</td><td>(A) Both Assertion (A) and Reason (R) are True and Reason (R) is the correct explanation for Assertion (A).</td><td></td></tr>
<tr><td></td><td>(1 Mark for writing the correct answer)
Note: Option (B) also to be accepted as the correct answer.</td><td></td></tr>
<tr><td>21.</td><td>Assertion (A) : The <code>ROUND()</code> function in SQL can be used to round off a number to a specified number of decimal places.
Reason (R) : The <code>ROUND()</code> function is a string function that accepts character values as input and returns numerical values as output.</td><td>1</td></tr>
<tr><td>Ans</td><td>(C) - Assertion (A) is TRUE and Reason (R) is FALSE</td><td></td></tr>
<tr><td></td><td>(1 Mark for writing the correct answer)</td><td></td></tr>
<tr><td></td><td>SECTION B</td><td></td></tr>
<tr><td>22.</td><td>(a) Mention any two main points of difference between Series and DataFrame of Python Pandas.</td><td>2</td></tr>
<tr><td>Ans</td><td>
<table>
<tr><th>Series</th><th>DataFrame</th></tr>
<tr><td>Series is one-dimensional</td><td>DataFrame is two-dimensional</td></tr>
<tr><td>Series is used for storing a single column of data.</td><td>DataFrame is used for storing multiple columns of data.</td></tr>
<tr><td>Elements in Series must be homogeneous</td><td>Elements in DataFrame may be heterogeneous.</td></tr>
<tr><td>Elements in Series are accessed using a single index.</td><td>Elements in DataFrame are accessed using two indices.</td></tr>
<tr><td>Size of Series is immutable</td><td>Size of DataFrame is mutable</td></tr>
</table>
</td><td></td></tr>
<tr><td></td><td>(1 Mark each for writing any two correct differences)
Note: Full 2 marks to be awarded if difference is explained using examples of each.
1 mark to be awarded if only examples of both are written.</td><td></td></tr>
<tr><td></td><td>OR
(b) Explain how we can access elements of a series using slicing. Give an example to support your answer.</td><td></td></tr>
<tr><td>Ans</td><td>Elements of a series can be accessed in any of the following ways using slicing:

Example:</td><td></td></tr>
</table>

	Considering **data** to be a pandas series containing values **[10, 20, 30, 40, 50]** having index as **['a','b','c','d','e']** **Positional Indexing/ Integer-based slicing:** Slice a Series using indices **# Slice the Series from the first to the third element** **data[0:3] OR data.iloc[0:3]** **Label-based slicing:** Slice a Series using its index labels. **data['b':'d'] OR data.loc['b':'d']** **Conditional slicing:** Slice a Series based on condition. **# Slice the Series where values are greater than 30** **#for a pandas series named as data** **data[data > 30]**	
	(1 Mark for explaining any one method of slicing) ***(1 Mark for correct example)*** ***Note:*** ***Full 2 marks to be awarded if accessing using slicing is explained with the help of an example.*** ***(1 mark to be awarded if only example is written)***	
23.	A small tech startup, is considering using open source software to develop their new project management tool. They are evaluating the benefits and potential challenges of adopting open source solutions.	2
	(i) Identify one key benefit of using open source software for the development of project management tool.	
Ans	Using open-source software to develop a new project management tool offers the following benefits: ● Open-source softwares mostly have support of large communities that contribute to the software, documentation, and shared knowledge, which is useful during development. ● Open-source software eliminates dependence on a single vendor. ● Open-source software can be easily integrated with other open-source tools and systems, reducing compatibility issues. ● Open-source software often incorporates the latest technologies, innovations, and best practices, ensuring developers have access to the most advanced tools and techniques. ● As Open-Source software provides access to a variety of existing open-source libraries and frameworks, developers can speed up the development process by building upon existing solutions. ● Open-source software is mostly cost effective.	
	(1 Mark for writing Any one correct benefit)	
	(ii) Give any two examples of open source software.	
Ans	Some Examples of open-source software: MySQL , PostgreSQL, Linux , Ubuntu, LibreOffice , OpenOffice , GIMP, Firefox, Chromium	
	(½ Mark each for writing Any two correct examples of Open-Source software)	

<table>
<tr><td>24.</td><td>Consider the string, "Informatics Practices". Write suitable SQL queries for the following :</td><td>2</td></tr>
<tr><td></td><td>(i) To convert the entire string to uppercase.</td><td></td></tr>
<tr><td>Ans</td><td>SELECT UCASE("Informatics Practices");
OR
SELECT UPPER("Informatics Practices");</td><td></td></tr>
<tr><td></td><td>(ii) To display the total number of characters in the given string.</td><td></td></tr>
<tr><td>Ans</td><td>SELECT LEN("Informatics Practices");
OR
SELECT LENGTH("Informatics Practices");</td><td></td></tr>
<tr><td></td><td>(1 Mark each for both the parts (i) and (ii)</td><td></td></tr>
<tr><td>25.</td><td>(a) Give any two points of difference between Static web page and Dynamic web page.</td><td>2</td></tr>
<tr><td>Ans</td><td>Differences between Static web page and Dynamic web page:
<table>
<tr><th>Static web page</th><th>Dynamic web page</th></tr>
<tr><td>A web page with content that is predefined and static.</td><td>A web page with content that changes dynamically.</td></tr>
<tr><td>Has limited interactivity.</td><td>It is highly interactive.</td></tr>
<tr><td>Requires minimum Server processing.</td><td>Requires server-side processing.</td></tr>
<tr><td>Lower development and hosting cost.</td><td>Higher development and hosting cost.</td></tr>
</table></td><td></td></tr>
<tr><td></td><td>(1 Mark each for writing Any two correct differences)
Note: Difference between static webpage and dynamic webpage explained with the help of an example to be accepted.</td><td></td></tr>
<tr><td></td><td>OR
(b) Describe the role of a router in a network.</td><td></td></tr>
<tr><td>Ans</td><td>Roles of router in a network:
Interconnecting networks: Router connects multiple networks, such as local area networks (LANs), wide area networks (WANs), and the Internet.
Routing traffic: Routers direct traffic between networks, ensuring that data packets are delivered to the correct destination.
Packet forwarding using Best route: Routers forward packets of data between networks, using the destination IP address to determine the best route to the destination.
Quality of Service: Routers prioritize traffic to ensure that critical applications receive sufficient bandwidth and low latency.
Firewall functionality: Many routers include built-in firewall capabilities, which block unauthorized access to the network.
Access control: Routers can restrict access to the network based on user authentication, IP addresses, and other criteria.
(Any one of the above or any other correct equivalent role of a router)</td><td></td></tr>
</table>

	(2 Marks for writing the correct role)	
26.	What is a Database Management System (DBMS) ? Mention any two examples of DBMS.	2
Ans	A Database Management System(DBMS) is software that lets us store, organize, manage, and retrieve data efficiently. **Examples**: MySQL, PostgreSQL, Microsoft Access, Oracle, Microsoft SQL Server, DB2 and Sybase	
	(1 Mark for defining DBMS) ***(½ Mark each for writing Any two correct examples of DBMS)***	
27.	Give any two impacts on environment that are caused when e-waste is carelessly thrown or dumped in landfills or dumping grounds.	2
Ans	Impacts of e-waste: ● **Soil contamination:** E-waste can leach toxic chemicals, such as lead, mercury, and cadmium, into the soil, contaminating it. ● **Air pollution:** Burning e-waste can release toxic fumes contributing to air pollution. ● **Water pollution:** E-waste can contaminate water posing a risk to the environment. **NOTE: Any two from the above or any other correct impacts of e-waste to be accepted**	
	(1 mark each for writing any 2 impacts)	

28.	(a) Rohit is trying to create a Pandas Series from scalar values. His code has some mistakes. Rewrite the correct code and underline the corrections made.
	`import pandas`
	`data = [50, 15, 40]`
	`series = pd.series(data, Index=['x', 'y', 'z'])`
	`Print(series)`
		2

Ans	`import pandas as pd`
	`data=[50,15,40]  #OR data = <any numeric value>`
	`series=pd.Series(data, index=['x', 'y', 'z'])`
	`print(series)`	

	(½ Mark each for identifying and correcting any 4 Errors) ***Note: Only 1 Mark to be awarded for identification (without correction) of all four mistakes***	

	OR
	(b) Complete the given Python code to generate the following output :
	`  COLOUR  NAME  QTY`
	`0  Red  Apple  10`
	`1  Blue  Berry  15`
	`2  Green  Guava  20`
	`import _____ as pd`
	`data=[{'COLOUR':'Red', 'NAME':'Apple', 'QTY':10},`	

	`{'COLOUR':'Blue','NAME':'Berry', 'QTY':15},`
	`{_____, 'NAME' :'Guava','QTY':20}]`
	`df=pd.DataFrame(_____)`
	`print(_____)`	

Ans	`import pandas as pd`
	`data= [{'COLOUR':'Red' , 'NAME': 'Apple' , 'QTY' : 10},`
	`{'COLOUR':'Blue' , 'NAME': 'Berry' , 'QTY' : 15},`
	`{'COLOUR':'Green' , 'NAME': 'Guava' , 'QTY' : 20}]`
	`df=pd.DataFrame(data)`
	`print(df)`	

	(½ Mark each for writing each correct missing part of the given code)	
	SECTION C	
29.	Ravi is a student studying in grade 12. He frequently uses the internet for various activities such as social networking, online shopping, and to research for school projects. Recently, he noticed that he receives targeted advertisements based on his browsing history and is concerned about his digital footprints. Additionally, Ravi has encountered instances of cyberbullying and is unsure how to handle them. Help Ravi by answering the following questions:	3
	(i) What are digital footprints, and how are they created?	
Ans	Digital footprints refer to the trail of data and information that individuals leave behind during online activities. Following are some of the ways digital footprints are created: ● **Browsing history**: Every time a website is visited, the browser records the URL, date, and time of the visit. ● **Search engine queries**: When a search is performed online, the search engine records search term(s) and query. ● **Social media interactions**: Social media activities, such as posts, comments, likes, and shares, are recorded by the platform. ● **Online purchases**: When an online purchase is made, the retailer records transaction details, including name, address, and payment information. ● **Surveillance cameras** in public places can capture images and movements. ● **RFID tags** can capture movements and activities.	
	(½ mark for writing correct definition of Digital Footprint) *(½ mark for writing any one correct way of creation)*	
	(ii) Write any two net etiquettes that Ravi should follow to ensure respectful and responsible online behavior.	
Ans	**To ensure respectful and responsible online behavior, Ravi should follow the following Net etiquettes:** ● Avoid using slang, jargon, or offensive language ● Avoid personal attacks, insults, or inflammatory language ● Consider others' perspectives and feelings	

	• Avoid spamming, trolling, or harassing others • Be sensitive to cultural nuances and differences in online interactions • Protect personal information • Use strong passwords • Be cautious with links and attachments • Be aware of online laws and regulations • Report online harassment or abuse	
	(½ mark each for writing any 2 correct net etiquettes)	
	(iii) How can Ravi protect himself from cyberbullying? Mention any one protective measure.	
Ans	Ravi should adopt following protective measures against cyberbullying: • Avoid sharing personal information in public. • Adopt safe privacy settings on Social Media accounts and Online Platforms • Use strong passwords • Be cautious with links and attachments • Use two-factor authentication • Block or report bullies • Be cautious about accepting friend requests and connections from strangers	
	(1 mark for writing any one protective measure)	
30.	(a) Write a Python program to create the following DataFrame using a Dictionary of Series : **City** **State** **0** Mumbai Maharashtra **1** Dehradun Uttarakhand **2** Bengaluru Karnataka **3** Hyderabad Telangana	3
Ans	**import pandas as pd** **d={** **'City':pd.Series(** **['Mumbai','Dehradun','Bengaluru','Hyderabad']),** **'State': pd.Series(** **['Maharashtra','Uttarakhand' , 'Karnataka' , 'Telangana'])** **}** **df=pd.DataFrame(d)** **print(df)** **OR** **import pandas as pd** **City=pd.Series(['Mumbai','Dehradun','Bengaluru','Hyderabad'])** **State=pd.Series(['Maharashtra','Uttarakhand','Karnataka','Telangana'])** **df=pd.DataFrame({'City':City, 'State':State})** **print(df)**	
	(1 mark for writing correct import statement) ***(1 mark for writing correct dictionary of Series)*** ***(1 mark for writing correct creation of DataFrame)***	

OR

(b) Write a Python program to create a Pandas Series as shown below from an ndarray containing the numbers `10, 20, 30, 40, 50` with corresponding indices `'A', 'B', 'C', 'D', 'E'`.

```
A    10
B    20
C    30
D    40
E    50
```

Ans

```
import pandas as pd
import numpy as np
data = np.array([10,20,30,40,50])   # np.arange(10,60,10)
s = pd.Series(data,index=['A', 'B', 'C', 'D', 'E'])
print(s)
```

OR

```
import pandas as pd
import numpy as np
L1=np.array([10,20,30,40,50])
L2=np.array(['A','B','C','D','E'])
S1=pd.Series(L1,index=L2)
print(S1)
```

(½ mark each for writing both correct import statements)
(1 mark for writing correct ndarray)
(1 mark for writing correct creation of Series)
Note:
2 Marks to be awarded if the Series is created without using ndarray.

31. (i) Write the SQL statement to create a table, **Customer** with the following specifications : (2+1) 3

Table:Customer

Column Name	Data Type	Key
CID	Int	Primary Key
FName	Varchar(20)	
LName	Varchar(20)	
Age	Int	

Ans

```
CREATE TABLE Customer (
  CID INT PRIMARY KEY,
  FName VARCHAR(20),
  LName VARCHAR(20),
  Age INT
);
```

OR

```
CREATE TABLE Customer (
  CID INT ,
  FName VARCHAR(20),
  LName VARCHAR(20),
  Age INT ,
  PRIMARY KEY (CID)
);
```

OR

```
CREATE TABLE Customer (
  CID INT ,
  FName VARCHAR(20),
  LName VARCHAR(20),
  Age INT ,
  CONSTRAINT PK_CID PRIMARY KEY (CID)
);
```

(½ mark for writing correct CREATE TABLE)
(1 mark for writing correct Field names & Datatype)
(½ mark for writing correct Primary Key constraint)

(ii) Write the SQL query to display all records in descending order of **LName** from the Table **Customer.**

Ans

```
SELECT * FROM Customer ORDER BY LName DESC;
```

(½ mark for writing **SELECT * FROM Customer*)***
(½ mark for writing **ORDER BY LName DESC*)***

32. (a) Given the following tables: 3

Table: STUDENTS

S_ID	NAME	AGE	CITY
1	Rahul	20	Delhi
2	Priya	22	Mumbai
3	David	21	Delhi
4	Neha	23	Bengaluru
5	Khurshid	22	Delhi

Table: GRADES

S_ID	SUBJECT	GRADE
1	Math	A
2	English	B
3	Math	C
4	English	A
5	Math	B

Write SQL queries for the following:

(i) To display the number of students from each city.

Ans

```
SELECT CITY, COUNT(*) FROM STUDENTS GROUP BY CITY;
```

Note:

- **`SELECT COUNT(*) AS <COLUMN ALIAS NAME> FROM STUDENTS GROUP BY CITY;` also to be accepted**
- **`SELECT COUNT(*) FROM STUDENTS GROUP BY CITY;` also to be accepted**

(½ mark for writing **`SELECT CITY, COUNT(*)FROM STUDENTS`*)*
(½ mark for writing **`GROUP BY CITY`*)***

(ii) To find the average age of all students.

Ans

```
SELECT AVG(AGE) FROM STUDENTS;
```

(½ mark for writing **`SELECT AVG(AGE)`*)***
(½ mark for writing **`FROM STUDENTS`*)***

(iii) To list the names of students and their grades.

Ans

```
SELECT NAME, GRADE FROM STUDENTS S, GRADES G
WHERE  S.S_ID = G.S_ID ;
```

OR

```
SELECT NAME, GRADE FROM STUDENTS, GRADES
WHERE STUDENTS.S_ID = GRADES.S_ID ;
```

OR

```
SELECT NAME, GRADE FROM STUDENTS NATURAL JOIN GRADES ;
```

(½ mark for writing **`SELECT NAME, GRADE FROM STUDENTS, GRADES`*)***
(½ mark for writing correct part to join the tables)

OR

(b) Consider the following tables:

Table 1: PRODUCTS

This table stores the basic details of the products available in a shop.

PID	PName	Category
201	Laptop	Electronics
202	Chair	Furniture
203	Desk	Furniture
204	Smartphone	NULL
205	Tablet	Electronics

Table 2: SALES

This table records the number of units sold for each product.

SaleID	PID	UnitsSold
301	201	50
302	202	100
303	203	60
304	204	80

305	205	70

Write SQL queries for the following:

(i) To delete those records from table **SALES** whose **UnitsSold** is less than 80.

Ans

```
DELETE FROM SALES WHERE UnitsSold < 80;
```

(½ mark for writing `DELETE FROM SALES`*)*
(½ mark for writing `WHERE UnitsSold < 80`*)*

(ii) To display the names of all products whose category is not known.

Ans

```
SELECT PName FROM PRODUCTS WHERE Category IS NULL;
```

(½ mark for writing `SELECT PName FROM PRODUCTS`*)*
(½ mark for writing `WHERE Category IS NULL`*)*

(iii) To display the product names along with their corresponding units sold.

Ans

```
SELECT PName, UnitsSold FROM PRODUCTS P, SALES S
WHERE  P.PID = S.P_ID ;
```

OR

```
SELECT PName, UnitsSold FROM PRODUCTS, SALES
WHERE PRODUCTS.PID = SALES.PID ;
```

OR

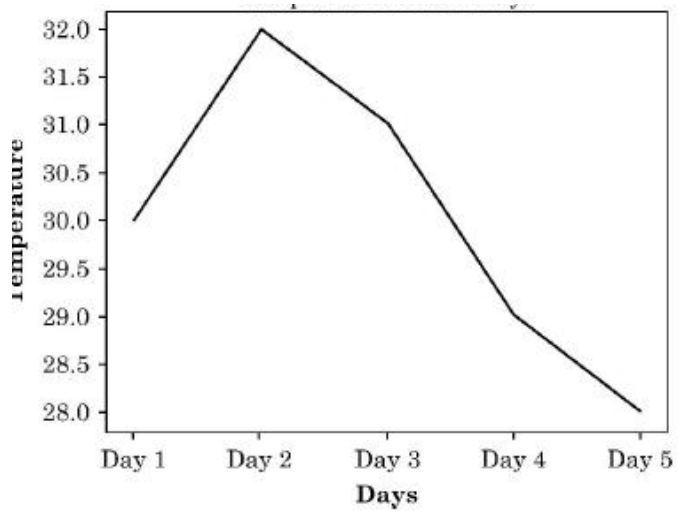
```
SELECT PName, UnitsSold FROM PRODUCTS NATURAL JOIN SALES;
```

(½ mark for writing `SELECT PName, UnitsSold`*)*
(½ mark for writing correct part to join the tables)

SECTION D

33. Gurkirat has to fill in the blanks in the given Python program that generates a line plot as shown below. The given line plot represents the temperature (in degree Celsius) over five days as given in the table : 4

Days	Temperature
Day 1	30
Day 2	32
Day 3	31
Day 4	29
Day 5	28




```
import ______ as plt # Statement-1
days = ['Day 1', 'Day 2', 'Day 3', 'Day 4', 'Day 5']
temp = [30, 32, 31, 29, 28]
plt.__(days, temp) # Statement-2
plt.xlabel('______') # Statement-3
plt.ylabel('Temperature')
plt.title('_____') # Statement-4
plt.show()
```

Write the missing statements according to the given specifications :

	(i) Write the suitable code to import the required module in the blank space in the line marked as Statement-1.	
Ans	`import matplotlib.pyplot as plt  #Statement 1`	
	(ii) Fill in the blank in Statement-2 with a suitable Python function name to create a line plot.	
Ans	`plt.plot(days,temp)  #Statement 2`	
	(iii) Refer to the graph shown and fill in the blank in Statement-3 to display the appropriate label for x-axis.	
Ans	`plt.xlabel('Days')  #Statement 3`	
	(iv) Refer to the graph shown and fill in the blank in Statement-4 to display the suitable chart title.	
Ans	`plt.title('Temperature over 5 days')  #Statement 4`	
	(1 mark for writing each correct missing part of statement)	
34.	(a) An educational institution is maintaining a database for storing the details of courses being offered. The database includes a table COURSE with the following attributes : **C_ID** : Stores the unique ID for each course. **C_NAME** : Stores the course's name. **INSTRUCTOR** : Stores the name of the course instructor. **DURATION** : Stores the duration of the course in hours.	4

Table : **COURSE**

C_ID	C_NAME	INSTRUCTOR	DURATION
C101	Data Structures	Dr. Alok	40
C102	Machine Learning	Prof. Sunita	60
C103	Web Development	Ms. Sakshi	45
C104	Database Management	Mr. Suresh	45
C105	Python Programming	Dr. Pawan	35

Write SQL queries for the following :

(i) To add a new record with following specifications :

```
C_ID          : C106
C_NAME        : Introduction to AI
INSTRUCTOR    : Ms. Preeti
DURATION      : 55
```

Ans

```
INSERT INTO COURSE VALUES('C106','INTRODUCTION TO AI',
    'MS.PREETI',55);
```

OR

```
INSERT INTO COURSE (C_ID, C_NAME, INSTRUCTOR, DURATION)
    VALUES('C106','INTRODUCTION TO AI','MS.PREETI',55);
```

(½ mark for writing **INSERT INTO COURSE***)*
(½ mark for writing
VALUES('C106','INTRODUCTION TO AI','MS.PREETI',55)*)*
Note: **VALUE** *in place of* **VALUES** *is to be accepted*

(ii) To display the longest duration among all courses.

Ans

```
SELECT MAX(DURATION) FROM COURSE;
```

(½ mark for writing **SELECT MAX(DURATION)***)*
(½ mark for writing **FROM COURSE***)*

(iii) To count total number of courses run by the institution.

Ans

```
SELECT COUNT(DISTINCT C_NAME)FROM COURSE;
```

(½ mark for writing **SELECT COUNT(DISTINCT C_NAME)***)*
(½ mark for writing **FROM COURSE***)*
Note: Instead of COUNT(DISTINCT C_NAME), any of the following to be accepted:
COUNT(C_NAME), COUNT(C_ID), COUNT(*)

(iv) To display the instructors' name in lower case.

Ans

```
SELECT LOWER(INSTRUCTOR) FROM COURSE;
```

OR

```
SELECT LCASE(INSTRUCTOR) FROM COURSE;
```

(½ mark for writing **SELECT LOWER(INSTRUCTOR)***)*
(½ mark for writing **FROM COURSE***)*

OR

(b) Ashutosh, who is a manager, has created a database to manage employee records. The database includes a table named EMPLOYEE whose attribute names are mentioned below :

EID : Stores the unique ID for each employee.
EMP_NAME : Stores the name of the employee.
DEPT : Stores the department of the employee.
SALARY : Stores the salary of the employee.
JOIN_DATE : Stores the employee's joining date.

Table : EMPLOYEE

EID	EMP_NAME	DEPT	SALARY	JOIN_DATE
E01	ARJUN SINGH	SALES	75000	2019-11-01
E02	PRIYA JAIN	ENGINEERING	85000	2020-05-20
E03	RAVI SHARMA	MARKETING	60000	2018-08-14
E04	AYESHA	NULL	50000	2021-01-10
E05	RAHUL VERMA	FINANCE	40000	2017-06-25

Write the output of the following SQL Queries :

(i)
```
Select SUBSTRING(EMP_NAME, 1, 5) from EMPLOYEE
where DEPT = 'ENGINEERING';
```

Ans

```
SUBSTRING(EMP_NAME, 1, 5)
-------------------------
PRIYA
```

(1 mark for writing the correct output)

(ii)
```
Select EMP_NAME from EMPLOYEE where month(JOIN_DATE)
= 8;
```

Ans

```
EMP_NAME
-----------
RAVI SHARMA
```

(1 mark for writing the correct output)

(iii)
```
Select EMP_NAME from EMPLOYEE where SALARY > 60000;
```

Ans

```
EMP_NAME
-----------
ARJUN SINGH
PRIYA JAIN
```

(1 mark for writing the correct output)

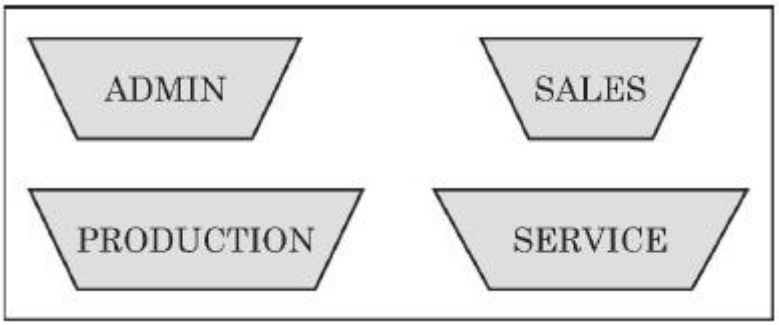
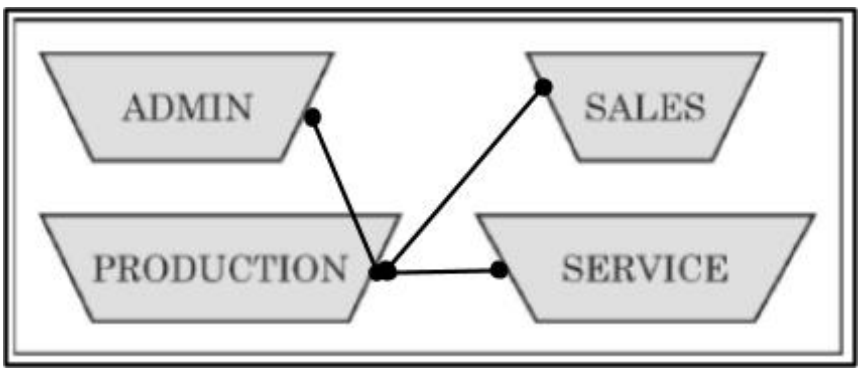
(iv)
```
Select count(DEPT) from EMPLOYEE;
```

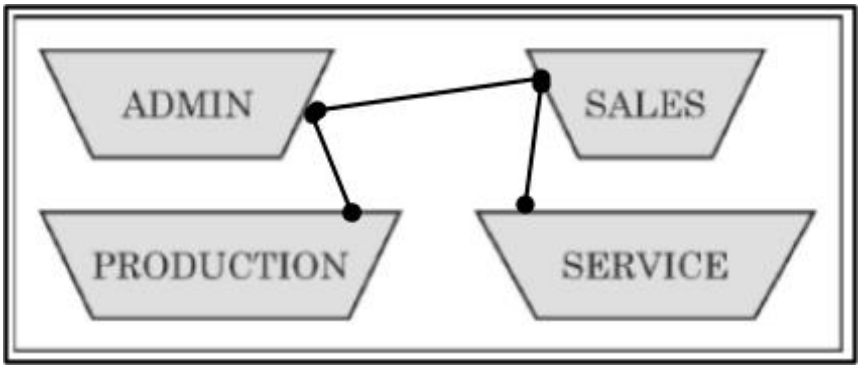
Ans

```
count(DEPT)
-----------
4
```

(1 mark for writing the correct output)

Note: Column headings to be ignored for all the MySQL outputs.

	SECTION E	
35.	XYZ Technologies, Hyderabad is a company that deals with data science and AI projects. They have different divisions ADMIN, SALES, PRODUCTION and SERVICE. The layout of the Hyderabad branch is :  The management wants to connect all the divisions as well as the computers of each division (ADMIN, SALES, PRODUCTION and SERVICE). Distance between the divisions are as follows : **ADMIN to SALES** — **69m** **ADMIN to PRODUCTION** — **84m** **ADMIN to SERVICE** — **60m** **SALES to PRODUCTION** — **110m** **SALES to SERVICE** — **135m** **PRODUCTION to SERVICE** — **90m** Number of computers in each division : **Division** — **Number of Computers** ADMIN — 40 SALES — 75 PRODUCTION — 120 SERVICE — 20 Based on the above specifications, answer the following questions :	5
	(i) Suggest the topology and draw the most suitable cable layout for connecting all the divisions in the Hyderabad office.	
Ans	Star topology  	

	OR Bus topology  	
	(½ mark for writing BUS OR STAR topology) ***(½ mark for drawing the cable layout as per the chosen topology)***	
	(ii) XYZ Technologies is having its head office in USA. Out of LAN, MAN and WAN, which kind of network will be created to connect Hyderabad office with USA Office ? Justify your answer.	
Ans	WAN will be created as the network connection needs to be across different countries.	
	(½ mark for writing the correct network type) ***(½ mark for writing the correct justification)***	
	(iii) Suggest the division for the placement of server. Explain the reason for your selection.	
Ans	Server should be placed in the Production division as it has the maximum number of computers.	
	(½ mark for writing the correct placement) ***(½ mark for writing the correct reason)***	
	(iv) Suggest the placement of Switch/Hub with justification.	
Ans	Switch/Hub should be placed in each of the divisions ADMIN, SALES, PRODUCTION and SERVICE as multiple devices need to be inter-connected.	
	(½ mark for writing the correct placement) ***(½ mark for writing the correct justification)***	
	(v) Where will a repeater be placed in the suggested network layout ? Justify your answer.	
Ans	Repeater will be placed: Between Sales and Production (for first layout - Star Topology) **OR** Between Sales and Service (for second layout - Bus Topology) **OR** Placement of Repeater according to the correct layout drawn in part(i) Because a repeater is required if the distance between the blocks is more and the repeater receives the weak signal, amplifies it, and retransmits it	
	(½ mark for writing the correct placement) ***(½ mark for writing the correct justification)***	
36.	Consider the DataFrame **Doctor** shown below:	5

	DID	NAME	DEPARTMENT	FEE
0	101	Dr. Joe	ENT	1500
1	102	Dr. Salma	UROLOGY	1600
2	103	Dr. Jeet	ORTHO	1550
3	104	Dr. Neha	ENT	1200
4	105	Dr. Vikram	ORTHO	1700

Write suitable Python statements for the following:

(i) To print the last three rows of the DataFrame **Doctor.**

Ans
```
print(doctor.tail(3))
```
OR
```
print(doctor.iloc[-3:])
```

(1 mark for writing the correct statement)

(ii) To display the names of all doctors.

Ans
```
print(doctor['Name'])
```
OR
```
print(doctor.iloc[:,[1]])
```
OR
```
print(doctor.loc[:,['Name']])
```

(1 mark for writing the correct statement)

(iii) To add a new column `'Discount'` with value of `200` for all doctors.

Ans
```
doctor['Discount']=200
```
OR
```
doctor.loc[:, "Discount"] = 200
```

(1 mark for writing the correct statement)

(iv) To display rows with index `2` and `3`.

Ans
```
print(doctor.loc[[2,3]])
```
OR
```
print(doctor.iloc[[2,3]])
```
OR
```
print(doctor[2:4])
```

(1 mark for writing the correct statement)

(v) To delete the column `'Department'`.

Ans
```
doctor.drop(['Department'],axis=1, inplace=True)
```
OR
```
doctor = doctor.drop(['Department'],axis=1)
```

(1 mark for writing the correct statement)
Note: axis=1 can be replaced with axis= 'columns'

37.	(a) Write SQL query for the following:	5
	(i) To display sum total of all the values of the **Score** column, from **STUDENTS** table.	
Ans	`SELECT SUM(Score) FROM STUDENTS;`	
	(½ mark for writing `SELECT SUM(Score)`*)* *(½ mark for writing* `FROM STUDENTS`*)*	
	(ii) To display the first five characters of the **Name** column from **STUDENTS** table.	

Ans	`SELECT LEFT(Name,5) FROM STUDENTS;`
	OR
	`SELECT MID(Name,1,5) FROM STUDENTS;`
	OR
	`SELECT SUBSTRING(Name,1,5) FROM STUDENTS;`
	OR
	`SELECT SUBSTR(Name,1,5) FROM STUDENTS;`	

	(½ mark for writing `SELECT part`*)* *(½ mark for writing* `FROM STUDENTS`*)*	
	(iii) To display the values of **Name** column from the **STUDENTS** table, after removing the trailing spaces.	
Ans	`SELECT RTRIM(Name) FROM STUDENTS;`	
	(½ mark for writing `SELECT RTRIM(Name)`*)* *(½ mark for writing* `FROM STUDENTS`*)*	
	(iv) To retrieve the lowest score from the **Score** column of **GRADES** table.	
Ans	`SELECT MIN(Score) FROM GRADES;`	
	(½ mark for writing `SELECT MIN(Score)`*)* *(½ mark for writing* `FROM GRADES`*)*	
	(v) To increase the fee of all students by **100**, in the **STUDENTS** table. (The name of the column is **FEE**)	
Ans	`UPDATE STUDENTS SET FEE = FEE + 100;`	
	(½ mark for writing `UPDATE STUDENTS`*)* *(½ mark for writing* `SET FEE = FEE + 100`*)*	
	OR (b) Write SQL queries for the following:	
	(i) To calculate the square of **15**.	

Ans	`SELECT POWER(15, 2);`
	OR
	`SELECT POW(15, 2);`	

	(½ mark for writing `SELECT part`*)* *(½ mark for writing* `POWER(15,2) OR POW(15,2)`*)*	
	(ii) To round the number **456.789** to the nearest integer.	
Ans	`SELECT ROUND(456.789);`	
	(½ mark for writing `SELECT part`*)* *(½ mark for writing* `ROUND(456.789)`*)*	

	(iii) To display the position of first occurrence of `'com'` in the string `'mycommercial.com'`.	
Ans	`SELECT INSTR('mycommercial.com','com');`	
	(½ mark for writing `SELECT INSTR`*)* *(½ mark for writing (*`'mycommercial.com','com'`*)*	
	(iv) To display the name of the day for the date `'2024-11-07'`.	
Ans	`SELECT DAYNAME ('2024-11-07');`	
	(½ mark for writing `SELECT`*)* *(½ mark for writing* `DAYNAME ('2024-11-07')`*)*	
	(v) To display the current date and time.	

Ans	`SELECT NOW();`
	OR
	`SELECT SYSDATE();`	

	(½ mark for writing `SELECT`*)* *(½ mark for writing* `NOW()/ SYSDATE()`*)*	