

## Specification Grid

**Subject: Computer Science**

**Grade 10**

**Full marks: 50**

**Time: 2 Hours**

- The types and number of questions, marks, and time allocation should follow the specific grid.
- The item format in composite questions should comply with the specification grid.
- The designated weightage of the units/content areas should be maintained.
- For Short Question (SQ) and Long Question (LQ), one mark should be assigned for each key element expected as the correct response.
- The distribution of cognitive domains should be approximately 20% Knowledge, 30% Understanding, 30% Application, and 20% Higher Ability.
- SQ and LQ may be structured into two or more sub-items and, where appropriate, may address more than one cognitive behaviour.

Item plan and marks distribution																		
S. N.	Area / Unit	Working Hour	Full Marks	Knowledge			Understanding			Application			Higher Ability			Total Questions		
				MCQ	S	L	MCQ	S	L	MCQ	S	L	MCQ	S	L	MCQ	S	L
1	Computer Network and Communication	14	11	1			1	1	1	1	1					3	2	1
2	Database Management System	10	8	1	1	1				1						2	1	1
3	Multimedia	10	8	1				1	1	1						2	1	1
4	Programming in Python	16	12	1							2	1	1	1		2	3	1
5	AI and Contemporary Technologies	14	11					1			1		1	1	1	1	3	1
	<b>Total</b>	<b>64</b>	<b>50</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>10</b>	<b>10</b>	<b>5</b>
	<b>Percentage</b>			20%			30%			30%			20%					

### Types and number of questions, marks and time allocation

Types of question	Number of questions	Marks	Time allocation
Multiple Choice Question (MCQ)	10 x 1 = 10	10	<b>2 hours</b>
Short Question (SQ)	10 x 2 = 20	20	
Long Question (LQ)	5 x 4 = 20	20	
<b>Total</b>	<b>25</b>	<b>50</b>	

**Note:** The distribution of questions among cognitive domains should be approximately 20% Knowledge/Remembering, 30% Understanding, 30% Applying and 20% Higher Ability Level. A variation of  $\pm 2$  marks will be allowed in the designated percentage.

ऐच्छिक कम्प्युटर विज्ञान  
कक्षा १०  
नमुना प्रश्नपत्र  
दिइएको निर्देशनअनुसार सिर्जनात्मक उत्तर दिनुहोस् ।

Give the creative answers based on the given instructions.

**Time: 2 Hours (समय : २ घण्टा)**

**Full Marks: 50 (पूर्णाङ्क: ५०)**

**Group 'A' (समूह 'क')**

दिइएका विकल्पहरूबाट सही उत्तर छान्नुहोस् र आफ्नो उत्तरपुस्तिकामा लेख्नुहोस् । (Choose the correct option from the following and write in your answer sheet.) (10×1=10)

1. कुन शब्दले सञ्चार माध्यमको अधिकतम डाटा वहन गर्ने क्षमता जनाउँछ ?

Which term refers to the maximum data-carrying capacity of a communication channel?

- a. ब्यान्डविथ Bandwidth  
b. थ्रुपुट Throughput  
c. फ्रिक्वेन्सी Frequency  
d. ब्रोडब्यान्ड Broadband

2. Bluetooth छोटो दुरीका उपकरणहरूबिच ताररहित सञ्चारका लागि CAT6, Coaxial Cable, र Optical Fiber भन्दा किन बढी उपयुक्त मानिन्छ ?

Why is Bluetooth considered more appropriate than CAT6, Coaxial Cable, and Optical Fiber for short-range wireless device communication?

- a. यसले तारयुक्त जडान प्रयोग गरी छिटो सञ्चार गर्छ ।  
It uses wired connections for faster communication.
- b. यसले नजिकका उपकरणहरूबिच वायरलेस सञ्चार गर्न अनुमति दिन्छ ।  
It allows wireless communication between nearby devices.
- c. यो मुख्य रूपमा लामो दुरीको इन्टरनेट जडानका लागि प्रयोग हुन्छ ।  
It is mainly used for long-distance internet connections.
- d. यो केवल टेलिभिजन प्रसारणका लागि मात्र प्रयोग हुन्छ ।  
It is used only for television broadcasting.

3. Network administrator ले network मा रहेका दुई कम्प्युटरबिच सफल सञ्चार भइरहेको छ कि छैन भनेर जाँच गर्न कुन command प्रयोग गर्नुपर्छ ?

Which command should a network administrator use to check whether two computers on a network are communicating successfully?

- a. पिङ ping  
b. फर्म्याट format  
c. कम्पाइल compile  
d. मर्ज merge

4. Database table मा प्रत्येक record लाई uniquely identify गर्ने key कुन हो ?

Which key uniquely identifies each record in a database table ?

- a. कम्पोजिट कि Composite key
- b. प्राइमरी कि Primary key
- c. क्यान्डिडेट कि Candidate key
- d. युनिक कि Unique key

5. Database table मा भण्डारण गरिएको student information प्राप्त गर्न कुन SQL command प्रयोग गरिन्छ ?

Which SQL command is used to retrieve student information from a database table?

- a. इन्सर्ट INSERT
- b. अपडेट UPDATE
- c. सेलेक्ट SELECT
- d. अल्टर ALTER

6. Web मा lossless image compression का लागि सामान्यतया प्रयोग हुने image file format कुन हो ?

Which image file format is commonly used for lossless image compression on the web?

- a. जेपीजी JPG
- b. पिएनजी PNG
- c. एमपिथ्री MP3
- d. एमओभी MOV

7. कम्प्युटरमा आफ्नो आवाजको recording भण्डारण गर्न तलका मध्ये कुन file format प्रयोग गर्नुपर्छ ?

Which of the following file formats should be used to store a recording of your voice on a computer?

- a. एसभीजी SVG
- b. वेभ WAV
- c. जिफ GIF
- d. पिडीएफ PDF

8. Python मा function define गर्न कुन keyword प्रयोग हुन्छ ?

Which keyword is used to define a function in Python?

- a. डेफ def
- b. फन fun
- c. डिफाइन define
- d. फङ्सन function

9. एक विद्यार्थीले दिइएको सङ्ख्या even हो वा होइन जाँच गर्न तलको Python code लेखेको छ: A student has written the following Python code to check whether a number is even or odd:

```
num = int(input("Enter a number: "))
if num % 2 == 0:
    print("Even")
else:
    print("Odd")
```

तर प्रयोगकर्ताले 4.5 जस्तो decimal value प्रविष्टि गर्दा program मा error आउँछ। Program लाई अझ robust बनाउन सबैभन्दा उपयुक्त modification कुन हो ?

However, the program shows an error when the user enters a decimal value like 4.5. What is the best modification to make the program more robust?

a. int() को सट्टा float() प्रयोग गर्ने र condition उस्तै राख्ने।

Replace int() with float() and keep the same condition.

- b.  $\text{num \% 2} == 0$  condition हटाउने ।  
Remove the condition  $\text{num \% 2} == 0$ .
- c. modulus operator (%) को सट्टा  $\text{num / 2} == 0$  प्रयोग गर्ने ।  
Use  $\text{num / 2} == 0$  instead of the modulus operator (%).
- d. input हटाएर value लाई hardcode गर्ने ।  
Remove the input and hardcode the value.
10. AI system मा bias घटाउन कुन अभ्यासले सबैभन्दा उत्तम सहयोग गर्छ ?  
Which is the best practice to reduce bias in AI systems?
- a. केवल एउटै प्रकारको data प्रयोग गर्ने  
Use only one type of data.
- b. Privacy rules बेवास्ता गर्ने  
Ignore privacy rules.
- c. विविध र प्रतिनिधित्व गर्ने data प्रयोग गर्ने  
Use diverse and representative data.
- d. Verification बिना output copy गर्ने  
Copy outputs without verification.

### Group 'B' (समूह 'ख')

दिइएका प्रश्नको छोटो उत्तर दिनुहोस् :

Answer the following questions briefly.

[10×2=20]

11. Internet र Intranet बिच कुनै दुई फरक लेख्नुहोस् ।  
Differentiate between the Internet and Intranet with any two valid points.
12. एक विद्यार्थीले घरमा कुनै cable प्रयोग नगरी laptop लाई internet मा connect गरेको छ । यस अवस्थामा data transmission का लागि कुन technology प्रयोग भइरहेको हुन्छ ? यसले कसरी काम गर्छ ?  
A student has connected a laptop to the internet at home without using any cables. Which technology is being used to transmit data in this situation, and how does it work?
13. Database Management System (DBMS) परिभाषित गर्नुहोस् र यसको एउटा फाइदा लेख्नुहोस् ।  
Define a Database Management System (DBMS) and mention one advantage of using it.
14. Raster graphics र Vector graphics बिच कुनै दुई फरक लेख्नुहोस् ।  
Differentiate between raster graphics and vector graphics with any two points.
15. Python मा `area_circle(r)` नामको function लेख्नुहोस् जसले वृत्तको क्षेत्रफल return गर्छ । (3.14 प्रयोग गर्नुहोस् ।)  
Write a Python function named `area_circle(r)` that returns the area of a circle. (Use 3.14)

16. प्रयोगकर्ताले non-numeric value input गर्दा आउने ValueError लाई handle गर्ने try-except प्रयोग गरिएको Python program लेख्नुहोस्।

Write a Python program using try-except to handle ValueError when a user enters a non-numeric value.

17. एक शिक्षकले परीक्षा परिणाम केवल table मा मात्र देखाउँछन्। यसले गर्दा विद्यार्थीहरूलाई आफ्नो performance बुझ्न कठिन हुन्छ। Data visualization ले यो समस्या कसरी समाधान गर्न सक्छ ? कारणसहित व्याख्या गर्नुहोस्।

A teacher shows exam results only in tables, and students find it hard to understand their performance. How can data visualization help solve this problem? Explain with reasons.

18. Supervised learning र Unsupervised learning लाई एक एक बुँदामा परिभाषित गर्नुहोस्।

Define supervised learning and unsupervised learning with one point each.

19. एउटा विद्यालयले कामदारहरूको निगरानी गर्न र उनीहरूको व्यक्तिगत जानकारी सङ्कलन गर्न AI system प्रयोग गर्छ। यसबाट उत्पन्न हुन सक्ने कुनै दुई ethical problems छोटकरीमा व्याख्या गर्नुहोस्।

A school uses an AI system to monitor workers and collect their personal information. Briefly explain any two ethical problems that may arise from this practice.

20. कुनै एउटा सहरमा traffic congestion र energy wastage जस्ता समस्या देखिएका छन्। Internet of Things (IoT) को प्रयोगले यी समस्याहरू कम गर्न कसरी मदत गर्न सक्छ ? कारणसहित कुनै दुई application लेख्नुहोस्।

A city is facing problems like traffic congestion and energy wastage. How can the use of the Internet of Things (IoT) help reduce these problems? Suggest any two applications with reasons.

### Group 'C' (समूह 'ग')

दिइएका प्रश्नहरूको लामो उत्तर दिनुहोस् :

Answer the following questions in long.

[5×4=20]

21. Broadband connection का विभिन्न प्रकारहरू के के हुन् ? तिनका प्रमुख विशेषताहरू र प्रयोगहरू व्याख्या गर्नुहोस्। What are the different types of broadband connections? Explain their main features and uses. [1+3]

22. Database र DBMS को परिभाषा लेख्नुहोस्। साथै fields र records लाई उपयुक्त उदाहरणसहित व्याख्या गर्नुहोस्। Define database and DBMS. Also, explain fields and records with suitable examples. [1+1+2]

23. Multimedia का मुख्य components वर्णन गर्नुहोस्। शिक्षामा multimedia का कुनै दुई प्रयोग व्याख्या गर्नुहोस्। Describe the major components of multimedia. Explain any two uses of multimedia in education. [2+2]

24. दिइएको Python program अध्ययन गरेर उत्तर दिनुहोस्:  
Study the following Python program and answer:

[2+2]

```
import pandas as pd
data = {'Name':['Asha','Bikash','Chandra'],
'Marks':[45,72,60]}
df = pd.DataFrame(data)
print(df[df['Marks']>=60])
```

- a. माथिको Python code को output लेख्नुहोस् ।  
Write the output of the above Python code.
- b. 60 भन्दा कम अङ्क ल्याएका विद्यार्थी देखाउने गरी code परिमार्जन गर्नुहोस् ।  
Modify the code to display students who scored less than 60.
25. एउटा विद्यालयले homework support का लागि AI प्रयोग गर्न चाहन्छ। जिम्मेवार प्रयोगका चार guidelines (privacy, bias, safety, and academic honesty) सुझाव दिनुहोस् ।  
A school wants to use AI tools for homework support. Suggest four responsible-use guidelines (privacy, bias, safety, and academic honesty). [4]

## Marking Scheme

ऐच्छिक कम्प्युटर विज्ञान

कक्षा १०

नमूना प्रश्नपत्र

Time: 2 Hours (समय: २ घण्टा)

Full Marks: 50 (पूर्णाङ्क: ५०)

### Group 'A' (समूह 'क')

Q.No.	Correct Answer	Marks [10×1=10]
1.	a. Bandwidth	1
2.	b. It allows wireless communication between nearby devices.	1
3.	a. ping	1
4.	b. Primary key	1
5.	c. SELECT	1
6.	b. PNG	1
7.	b. WAV	1
8.	a. def	1
9.	a. Replace int() with float() and keep the same condition.	1
10.	c. Use diverse and representative data.	1

### Group "B" (समूह "ख")

Q. No.	Correct Answer	Marks [10×2=20]
11.	<ul style="list-style-type: none"><li>• Internet is a public global network, whereas Intranet is a private network within an organization.</li><li>• Internet is accessible to everyone, whereas Intranet is accessible only to authorized users.</li></ul> <i>Or (any satisfactory answer)</i>	Correct complete difference - 1+1 mark Incomplete or vague differences - 0.5 to 1 mark Only names/examples without explanation -0.5 mark each
12.	<ul style="list-style-type: none"><li>• Technology used: Wi-Fi / Wireless technology.</li><li>• It transmits data using radio waves between the router and the laptop without physical cables.</li></ul> <i>Or (any satisfactory answer)</i>	2 (1 mark for technology and 1 mark for explanation)

13.	<ul style="list-style-type: none"> <li>• DBMS (Database Management System) is software used to store, manage, and retrieve data efficiently.</li> <li>• Advantage: It reduces data redundancy / improves data security / allows easy data retrieval.</li> </ul> <p><i>Or (any satisfactory answer)</i></p>	2 (1 mark for suitable definition and 1 mark for one correct advantage)
14.	<ul style="list-style-type: none"> <li>• Raster graphics are made of pixels, whereas vector graphics are made of mathematical paths.</li> <li>• Raster graphics lose quality when enlarged, whereas vector graphics do not lose quality when scaled.</li> </ul> <p><i>Or (any satisfactory answer)</i></p>	Correct complete difference 1+1 mark Incomplete or vague differences 0.5 to 1 mark Only names/examples without explanation 0.5 mark each
15.	<pre>def area_circle(r):     return 3.14 * r * r r = float(input("Enter radius: ")) print("Area =", area_circle(r))</pre> <p><i>Or (any satisfactory coding)</i></p>	2 (1 mark for defining function and 1 mark for calling function and passing value)
16.	<pre>try:     num = int(input("Enter a number: "))     print(num) except ValueError:     print("Invalid input! Please enter a numeric value.")</pre> <p><i>Or (any satisfactory coding)</i></p>	2
17.	<ul style="list-style-type: none"> <li>• Data visualization helps students understand data easily through graphs/charts.</li> <li>• It helps identify trends, strengths, weaknesses, and comparisons quickly.</li> </ul> <p><i>Or (any satisfactory answer)</i></p>	2 (1 mark for each valid reason)
18.	<ul style="list-style-type: none"> <li>• Supervised learning: A machine learning method where the model is trained using labelled data</li> <li>• Unsupervised learning: A machine learning method where the model finds patterns from unlabeled data</li> </ul> <p><i>Or (any satisfactory answer)</i></p>	2 (1/1 mark for each suitable definition)
19.	<ul style="list-style-type: none"> <li>• Privacy issues due to collection and misuse of personal information</li> <li>• Bias or unfair treatment in AI decisions and</li> </ul>	2 (1/1 mark for each ethical problem)

	monitoring <i>Or (any satisfactory answer)</i>	
20.	<ul style="list-style-type: none"> <li>• Smart traffic management system can reduce traffic congestion using sensors and real-time monitoring.</li> <li>• Smart energy management systems can reduce electricity wastage by automatically controlling lights and devices.</li> </ul> <i>Or (any satisfactory answer)</i>	2 (1/1 mark for each suitable application with reason)

**Group 'C' (समूह 'ग')**

Q. No.	Correct Answer	Marks [5×4=20]
21.	<p><b>DSL:</b> Uses telephone lines for internet connection; suitable for homes and offices.</p> <p><b>Cable:</b> Uses cable TV network; provides faster speed than DSL.</p> <p><b>Fiber Optic:</b> Uses optical fibers and light signals; provides very high-speed internet.</p> <p><b>Satellite:</b> Uses communication satellites; useful in remote areas.</p> <p><b>Wireless:</b> Uses radio waves without cables; includes Wi-Fi and mobile broadband.</p> <i>Or (any satisfactory answer)</i>	1+3 (1 mark for suitable introduction and 3 marks for explanation of types/features/uses)
22.	<ul style="list-style-type: none"> <li>• Database: An organized collection of related data</li> <li>• DBMS: Software used to manage and manipulate databases</li> </ul> <p><b>Explanation:</b></p> <ul style="list-style-type: none"> <li>• Field: A single piece of information (e.g., Name).</li> <li>• Record: A collection of related fields (e.g., one student's details)</li> </ul> <p><b>Example:</b> Student table with fields Name, Age, Marks. One row represents one record.</p> <i>Or (any satisfactory answer)</i>	1+1+2 (0.5+0.5 for definitions and 2 marks for explanation with suitable example)

23.	<p><b>Components of Multimedia:</b></p> <ul style="list-style-type: none"> <li>• Text</li> <li>• Audio</li> <li>• Video</li> <li>• Images/Graphics</li> <li>• Animation</li> </ul> <p><b>Uses in Education:</b></p> <ul style="list-style-type: none"> <li>• Makes learning more interactive and interesting</li> <li>• Helps students understand concepts better using audio-visual materials.</li> </ul> <p><i>Or (any satisfactory answer)</i></p>	2+2 (2 marks for components and 1+1 mark for uses)
24.	<p><b>a. Output:</b></p> <p style="padding-left: 20px;">Name Marks</p> <p>1 Bikash 72</p> <p>2 Chandra 60</p> <p><b>b. Modified Code:</b></p> <pre>import pandas as pd data = {     'Name': ['Asha', 'Bikash', 'Chandra'],     'Marks': [45, 72, 60] } df = pd.DataFrame(data) print(df[df['Marks'] &lt; 60])</pre> <p><i>Or (any satisfactory code)</i></p>	2+2
25.	<ul style="list-style-type: none"> <li>• Protect student privacy and do not share personal information</li> <li>• Check AI systems for bias and fairness regularly</li> <li>• Ensure safe use of AI and avoid harmful/inappropriate content</li> <li>• Maintain academic honesty; students should not copy AI-generated answers directly</li> </ul> <p><i>Or (any satisfactory answer)</i></p>	4 (Each correct guideline - 1 mark)