
1. What is dictionary? Give a real time example.

2. Name any 6 characters of a dictionary.

3. Answer the following based on the dictionary

Shop={'soap':25,'watch':350,'perfume':500,'paste':120,'shampoo':300}

a. Find out the number items in this dictionary

b. Display the price of perfume

c. Change the price of watch to 400

d. Display the list of keys and values separately

e. Show all the items present

f. Add a new item as shirt:900

g. Find out paste in the shop if found display it's price otherwise display 'no found'

h. Search for paste in the dictionary

Find the output of the following codes:

(a)

```
D1 = {1 : 10, 2 : 20, 3 : 30, 4 : 40, 5 : 50}
```

```
print(D1.keys())
```

```
print(D1.values())
```

```
print(D1.items())
```

(b)

```
D1 = {1 : 10, 2 : 20, 3 : 30, 4 : 40}
```

```
D2 = {5 : 50, 6 : 60, 7 : 70}
```

```
print(D1.update(D2))
print(D1)
```

```
(c)
D3 = {1 : 100, 2 : 150, 3 : 200}
D4 = {4 : 250, 2 : 175, 5 : 400, 3 : 225}
print(D3.update(D4))
print(D3)
```

```
(d)
Comp = { 'Dell' : 25000, 'HP' : 28500, 'Lenovo' : 23250 }
NewComp = { 'Acer' : 17300, 'Lenovo' : 24500, 'Apple' : 37400 }
Comp.update(NewComp)
print(Comp)
```

```
(e)
TV = { 'Ikon' : 22000 , 'Samsung' : 29300, 'LG' : 27800, 'Sony' : 38000, 'Philips' : 24000}
print(TV.keys())
print(TV.values())
del TV['Sony']
print(TV)
TV.pop('LG')
print(TV)
print(TV.clear())
print(TV)
```

```
(f)
TV = { 'Ikon': 22000 , 'Samsung' : 29300, 'LG' : 27800, 'Sony' : 38000, 'Philips' : 24000 }
print('Sony' in TV)
print('TCL' in TV)
print('Philips' not in TV)
print('SAMSUNG' not in TV)
```

```
(g)
Comp = { 'Dell' : 25000, 'HP' : 28500, 'Lenovo' : 23250, 'Acer' : 17300, 'Apple' : 37400}
print(len(Comp))
del(Comp['Acer'])
print(Comp)
Comp['Asus'] = 29500
Comp.pop('HP')
print(len(Comp))
```

Answer the following based the dictionary d1 given

`d1={'a':10,'c':30,'e':50,'b':20,'d':40}`

- a. Display the keys of the dictionary in ascending order.
- b. Find the maximum value among the keys.
- c. Find the minimum value among the values.
- d. Find out the sum of values of keys 'a' and 'e'.
- e. Find the sum of all the values.

WORKSHEET – STRING HANDLING

1	What will be the output of following code- str="hello" str[:2]
2	What will be the output of following code- str='Hello' res="" for i in range(len(str)): res=res+str[i] print(res)
3	What will be the output of following code- s='Hi!' s1='Hello' s2=s[:2]+s1[len(s 1)-2:] print(s2)
4	What will be the output of following code- 'ba'+'\n' a'*2
5	What will be the output of following code- s='Welcome to python4csip.com' print(s.find('come')) s.count('o')

What will be the output of following program: **s='Hello'**
for i in s:
 print(i,end='#')

What will be the output of following program: <pre>for i in 'hardik': print(i.upper())</pre>
What will be the output of following program: <pre>s='Hello' for i in s: print('Welcom e')</pre>
What will be the output of following program: <pre>str='virat' for i in str: print(str.upper())</pre>

10	What will be the output of following program: <pre>a='hello' b='virat' for i in range(len(a)): print(a[i],b[i])</pre>
11	What will be the output of following program: <pre>a='hello' b='virat' for i in range(len(a)): print(a[i].upper(),b[i])</pre>
12	What will be the output of following program: <pre>print("xyyzxyzxyy".count('xyy', 2, 11))</pre>
13	What will be the output of following program: <pre>print("hello"+11+2+3)</pre>

14	What will be the output of following program: <pre>str1 = "PYTHON2026CSIP.COM" print(str1[1:4], str1[:5], str1[4:], str1[0:-1], str1[:-1])</pre>
15	What will be the output of following program: <pre>str = "my name is kunfu pandya"; print (str.capitalize())</pre>
16	What will be the output of following program: <pre>str1 = 'Hello' str2 = 'World!' print('str1 + str2 = ', str1 + str2) print('str1 * 3 =', str1 * 3)</pre>
17	What will be the output of following program: <pre>count = 0 for letter in 'Hello World': if(letter == 'l'): count += 1 print(count,'letters found')</pre>
18	What will be the output of following program: <pre>s="python4csip" n = len(s) m="" for i in range(0, n): if (s[i] >= 'a' and s[i] <= 'm'): m = m + s[i].upper() elif (s[i] >= 'n' and s[i] <= 'z'): m = m + s[i-1] elif (s[i].isupper()): m = m + s[i].lower() else: m = m + '#' print(m)</pre>

19	What will be the output of following program: a = "Mahender Singh Dhoni" a = a.split() b = a[0][0]+" ".+a[1][0]+" ".+a[2] print (b)
20	What will be the output of following program: s='Mahender, Singh, Dhoni' s1=s.split() for i in s1: print(i)
21	What will be the output of following program: "Welcome to Python4csip.com".split()
22	What will be the output of following program: str ='Hello Python' print (str) print (str[0]) print (str[2:8]) print (str[3:]) print (str * 3) print (str + "String")
23	What will be the output of the program? line = "PYTHON IS EASY TO LEARN" L = line.split('a') for i in L: print(i, end=' ')

24	What will be the output of following program: <pre>s='mahender, singh, dhoni' s1=s.split() for i in s1: if(i>'n'): print(i.upper()) else: print(i)</pre>
25	What will be the output of following program: <pre>my_string = 'PYTHON2026CS' for i in range(len(my_string)): print (my_string) my_string = '#'</pre>
26	What will be the output of following program: <pre>str="Python4cs.com" for i in range(len(str)): if(str[i].isalpha()): print(str[i-1],end="") if(str[i].isdigit()): print(str[i],end="")</pre>
27	What will be the output of following program: <pre>str="AB23ZR12WERT56ZS" for i in range(len(str)): if(str[i].isalpha()): print(str[i-1],end="") if(str[i].isdigit()): print('#',end="")</pre>

28	What will be the output of following program: <pre>str="PYTHONKVSONEPUR2026" for i in range(len(str)): if(str[i].isdigit()): print(str[i],end='') if(str[i]=='N'or str[i]=='Y'): print('#',end='')</pre>
29	Write a Program to Count the Number of Vowels in a String.
30	Write a Program to Take in a String and Replace Every Blank Space with Hyphen.

KENDRIYA VIDYALAYA SANGATHAN CHENNAI REGION

HALF YEARLY : 2023-24

CLASS: XI

SUB: 044-BIOLOGY

TIME: 3Hrs

MAX. MARKS: 70

GENERAL INSTRUCTIONS:

- (i) All questions are compulsory.
- (ii) The question paper has five sections and 33 questions.
- (iii) Section-A has 16 questions of 1 mark each; Section-B has 5 questions of 2 marks each; Section-C has 7 questions of 3 marks each; Section-D has 2 case-based questions of 4 marks each; and Section-E has 3 questions of 5 marks each.
- (iv) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
- (v) Wherever necessary, neat and properly labelled diagrams should be drawn.

SECTION: A

Q.No	Question	Marks
1	Which of the following level in taxonomical hierarchy, shows the least similarity in characters among the members? [a] Species [b] Class [c] Family [d] Order	1
2	 Among the given animals, which one will show the type of coelom depicted in the given picture. [a] Earthworm [b] Silkworm [c] Roundworm [d] Tapeworm	1
3	Protonema is [a] Haploid and is found in mosses [b] Diploid and found in liverworts [c] Diploid and found in mosses [d] Haploid and found in pteridophytes	1
4	Pick out the organisms that have heterocysts. [i] Lactobacillus [ii] Nostoc [iii] Euglena [iv] Anabaena [a] Both i and ii [b] Both ii and iv [c] Both iii and iv [d] Both i and iii	1
5	What is common in Funaria, Dryopteris and Ginkgo? [a] Presence of archegonium [b] Well developed vascular tissue [c] Independent gametophyte [d] Independent sporophyte	1
6	The transverse section of a plant part showed polyarch, radial and exarch xylem, with endodermis and pericycle. The plant part is identified as [a] Monocot stem [b] Monocot root [c] Dicot stem [d] Dicot root	1

7

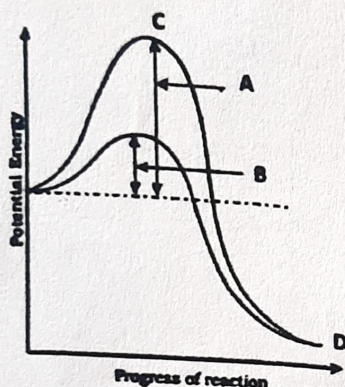
Match the column I and II with correct options

Column I	Column II
A. Polyadelphous stamens	[i] Brinjal
B. Diadelphous stamens	[ii] Lily
C. Epipetalous stamens	[iii] Citrus
D. Epiphyllous stamens	[iv] Pea
	[v] China rose

[a] A-i [b] B-ii [c] C-iv [d] D-iii
 [c] A-iii [b] B-iv [c] C-i [d] D-ii

[b] A-iv [b] B-iii [c] C-v [d] D-ii
 [d] A-ii [b] B-iii [c] C-iv [d] D-i

8



Study the graph showing the concept of activation energy. Identify the correct labellings of A, B, C and D from the given options.

A	[i] Transition state
B	[ii] Activation energy with enzyme
C	[iii] Product
D	[iv] Activation energy without enzyme

[a] A-iii, B-iv, C-i, D-ii
 [c] A-ii, B-i, C-iii, D-iv

[b] A-iv, B-ii, C-i, D-iii
 [d] A-iv, B-iii, C-i, D-ii

9

In Kreb's cycle, citric acid is formed when acetyl CoA combines with
 [a] Malic acid [b] Succinic acid
 [c] Fumaric acid [d] Oxaloacetic acid

10

The number of ATP and NADPH₂ molecules required for fixing one molecule of CO₂ in Calvin cycle is
 [a] 3 ATP, 2 NADPH₂ [b] 2 ATP, 3 NADPH₂
 [c] 1 ATP, 2 NADPH₂ [d] 2 ATP, 2 NADPH₂

11

Identify the structure which is absent in eukaryotic cells.
 [a] Ribosomes [b] Plasmodesmata
 [c] Mesosomes [d] Microbodies

12

Pick out a purine from the following.
 [a] Thymine [b] Cytosine
 [c] Uracil [d] Adenine

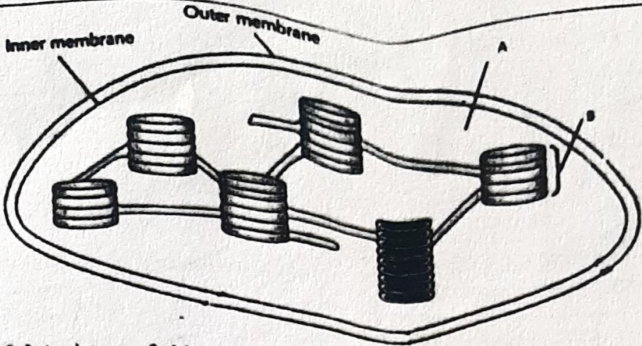
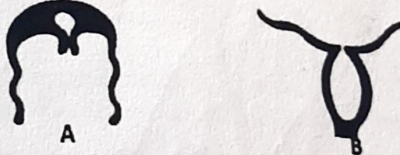
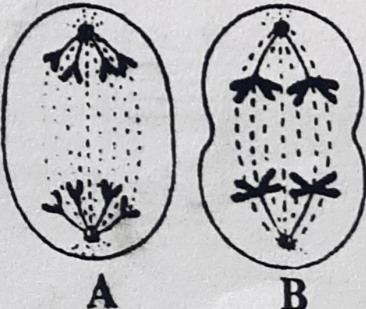
Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

- A. Both A and R are true and R is the correct explanation of A.
- B. Both A and R are true and R is not the correct explanation of A.
- C. A is true but R is false.
- D. A is false but R is true.

13	Assertion- Ribozymes are a type of enzymes. Reason- All enzymes are proteins.	1
14	Assertion- Cell growth results in disturbing the ratio between the nucleus and cytoplasm. Reason- Mitosis helps the cell to restore the nucleocytoplasmic ratio..	1
15	Assertion- In the electron transport system of respiration, the electrons are passed on to oxygen resulting in the formation of H_2O . Reason: Oxygen is the ultimate acceptor of electrons.	1
16	Assertion- Cyclic photophosphorylation synthesizes ATP. Reason- ATP synthesis in cyclic photophosphorylation is not associated with NADPH production.	1

SECTION: B

17	 [a] Identify the type of flower based on the position of ovary. [b] What is the position of ovary with respect to other floral whorls? [c] Give an example of this type of flower.	2									
18	Given below is a table. Fill up the boxes A,B,C and D with the appropriate terms. <table border="1"> <thead> <tr> <th>Class of algae</th><th>Stored food</th><th>Hydrocolloid obtained from them</th></tr> </thead> <tbody> <tr> <td>Phaeophyceae</td><td>A</td><td>C</td></tr> <tr> <td>Rhodophyceae</td><td>B</td><td>D</td></tr> </tbody> </table>	Class of algae	Stored food	Hydrocolloid obtained from them	Phaeophyceae	A	C	Rhodophyceae	B	D	2
Class of algae	Stored food	Hydrocolloid obtained from them									
Phaeophyceae	A	C									
Rhodophyceae	B	D									
19	[a] Give 2 external features that distinguish male frogs from female frogs. [b] How are the eyes of frogs protected under water? [c] Name the portal system seen in frogs that connects the liver and intestine.	2									

20	 [a] A picture of chloroplast is given. Label the parts A and B [b] Name the plastids that store fats/oils and proteins.	2
21	Binomial nomenclature is important for naming organisms. What are the rules to be followed while using scientific names? OR [a] Define the term systematics. [b] How does systematics help in taxonomy?	2
	SECTION: C	
22	 [a] Identify the 2 forms A and B seen in the life cycle of certain cnidarians. [b] Name the process of alternation of generation seen in them and give an example of an animal showing this phenomenon. [c] Why are cnidarians called so?	3
23	Non-protein constituents called co-factors are bound to enzymes to make them catalytically active. Explain the different kinds of co-factors with examples.	3
24	Yeast is used to make bread and wine. Explain the reaction that is helpful in this process. Mention the enzymes involved.	3
25	[a] Identify the stages of cell division A and B and mention the major differences between the two. 	3

[b] At the beginning of the G_1 phase, chromosome number of a cell is 16 and the DNA content is $2C$. What will be the number of chromosomes and DNA content at the end of S phase?

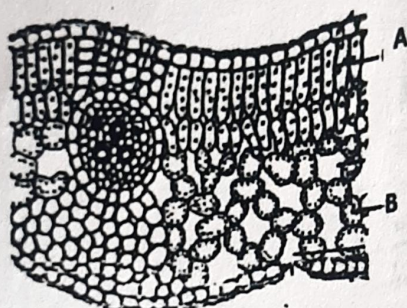
26



3

- [a] What types of vascular bundles are shown here?
 [b] Mention the main differences between these vascular bundles.
 [c] Mention their location.

OR



- [a] Identify the type of leaf shown in the diagram. What will be the shape of guard cells in these leaves?
 [b] Label the parts A and B
 [c] Name the tissue seen between the upper and lower epidermis.

27

- [a] How did Engelmann contribute to the study of photosynthesis?
 [b] What are the functions of accessory pigments?

3

28

Fill up the boxes marked A,B,C,D,E and F with the correct terms.

3

A	Chief producers in the oceans
An organism that causes red tide	B
C	Asexual spores of Ascomycetes
Smallest living cells known.	D
E	The protein coat of viruses
The parasite that causes sleeping sickness.	F

SECTION: D

Q.no 29 and 30 are case based questions. Each question has subparts with internal choice in one subpart.

29

Fungi constitute a unique kingdom of heterotrophic organisms. They show a great diversity in morphology and habitat. When your bread develops a mould or your orange rots, it is because of fungi. The common mushroom you eat and toadstools are also fungi. Some fungi are parasites on plants and cause enormous economic loss. Unicellular fungus like yeast is used to make bread and beer. The first antibiotic Penicillin was isolated from a fungus. Some fungi are used in the study of genetics.

4

	Many fungi reproduce by both sexual and asexual spores. [a] Give two examples where fungi associate with other organisms to form symbiotic association. [b] Which group of fungi are called imperfect fungi? Why are they called so? [c] Name a fungus which is used extensively in biochemical and genetic work. OR [c] Name the fungus which causes rust disease.	
30	The most abundant enzyme in the biosphere RuBisCO can act both as a carboxylase and an oxygenase enzyme. Under certain conditions, RuBisCO catalyses a wasteful oxygenation reaction called photorespiration. Certain plants have overcome this by adopting another pathway called C₄ pathway. These plants are called C₄ plants. They are adapted to grow in areas with high light intensity and high temperature. [a] Which is the primary CO₂ acceptor in C₄ cycle. Why is C₄ pathway called so? [b] In which cells do the C₄ plants have RuBisCO? In which cells the initial carboxylation occurs? [c] Give 2 examples of C₄ plants. OR [c] Give 2 features seen in the leaf anatomy of C₄ plants.	4
SECTION: E		
31	 [a] A picture of a typical chordate is given. Label the parts A, B, C and D. [b] How is cephalochordata different from urochordata? [c] With respect to the position of heart, what is the main difference between chordates and non-chordates? OR [a] Both gymnosperms and angiosperms bear seeds. Yet they are classified separately. Why is it so? [b] Define the term strobilus. Give an example of a pteridophyte which bears strobilus. [c] Differentiate between antheridium and archegonium.	5
32	[a] Identify the type of placentation from the given information and give an example of a plant showing it. [i] Single ovule attached at the base of the ovary. [ii] Many ovules arranged at the centre of a multilocular ovary [b] How is the radicle and plumule protected in maize seed? [c] What is the term used to denote the cotyledon present in maize seed? [d] Define the term parthenocarpic fruit. OR	5

शीतकालीन अवकाश गृहकार्य (हिंदी)

कक्षा -ग्यारहवी

1-पढ़ाये गये सभी पाठ के गृहकार्य पूरा कीजिए ।

2-डायरी लिखन-विषय -क.आपके दोस्त के साथ आज आपका झगड़ा होगया ।

ख. परीक्षा में अच्छे अंक प्राप्त करने कि वजह से आप बहत खुश है ।

3-अपु के साथ ढाई साल पाठ में पथेर पांचाली फ़िल्म सूटिंग के वक्त आये हुए बधाओं को लिखिए ।

गतिविधि

4-*रामानंद सागर के रामायण और रिलीज होनेबाली नितेश तिवारी के नई रामायण में कौन कौनसा चरित्र हैं उनका सूची बनाइए ।

*कौन कौनसी चरित्र पुराने रामायण से नई रामायण में लिया गया हैं पता करके लिखिए ।

*दौनो रामायण के कुछ तस्वीर चिपकाईये ।

PM SHRI KV SONEPUR

CLASS 11 – AUTUMN BREAK HOLIDAY HOMEWORK

1. Complete Textbook Exercises

Chapter 7

- Solve and complete **all exercises** thoroughly.
- Do not miss the **Miscellaneous Exercise** of Chapter 7. Practice every problem in your notebook.

2. Exemplar Problem Solving

Practice

- Solve all subjective and objective problems from the NCERT Exemplar book related to the covered topics.

3. Trigonometry Formula Chart

Chart Project

- Make a comprehensive, colorful **Formula Chart of Trigonometry** (including compound angles, multiple & sub-multiple angles, and transformation formulas).

4. Graph Chart of Functions

Visual Project

- Make a detailed **Graph Chart of all standard functions** (Trigonometric functions, Polynomial functions, Exponential, Logarithmic, Modulus, Greatest Integer, etc.).
- Clearly mention the **Domain and Range** alongside each function graph.

IMPORTANT INSTRUCTIONS

Ensure all homework assignments, problem sets, and charts are neatly presented and completed before school reopens after the autumn break.

CLASS XI: CHEMISTRY HOLIDAY HOMEWORK

SECTION A: MULTIPLE CHOICE QUESTIONS (1 Mark Each)

1. What will be the molarity of a solution containing 5 g of NaOH in 250 mL of solution?
(a) 0.5 M (b) 0.1 M (c) 0.2 M (d) 1.0 M
2. A measured temperature on Fahrenheit scale is 200°F. What will this reading be on the Celsius scale?
(a) 93.3°C (b) 11.2°C (c) 40°C (d) 123°C
3. If the concentration of glucose (C₆H₁₂O₆) in blood is 0.9 g/L, what will be its molarity?
(a) 0.005 M (b) 50 M (c) 0.05 M (d) 0.5 M
4. Which of the following numbers has 3 significant figures?
(a) 0.003 (b) 3.00 (c) 130 (d) 3000
5. The total number of orbitals associated with the principal quantum number $n = 3$ is:
(a) 3 (b) 6 (c) 9 (d) 12
6. Which electronic configuration violates Pauli's Exclusion Principle?
(a) 1s², 2s², 2p¹ (b) 1s³, 2s¹ (c) 1s², 2s², 2p⁶ (d) 1s², 2s¹
7. The wavelength associated with a golf ball weighing 200 g moving at a speed of 20 m/s is of the order of:
(a) 10⁻¹⁰ m (b) 10⁻²⁰ m (c) 10⁻³⁰ m (d) 10⁻⁴⁰ m
8. The pair of ions having identical electronic configuration is:
(a) Cr³⁺, Fe³⁺ (b) Fe³⁺, Mn²⁺ (c) Fe³⁺, Co³⁺ (d) Sc³⁺, Cr³⁺
9. Which of the following elements has the highest negative electron gain enthalpy?
(a) Fluorine (b) Chlorine (c) Bromine (d) Iodine
10. The correct order of increasing ionic radii among the following is:
(a) $F^- < Na^+ < O^{2-}$ (b) $Na^+ < F^- < O^{2-}$ (c) $O^{2-} < F^- < Na^+$ (d) $Na^+ < O^{2-} < F^-$
11. The element with the atomic number 117 has not been fully studied yet. In which family/group would you place it?
(a) Noble gases (b) Halogens (c) Alkaline earth metals (d) Chalcogens
12. In the modern periodic table, the period indicates the value of:
(a) Atomic number (b) Atomic mass (c) Principal quantum number (n) (d) Azimuthal quantum number (l)
13. The shape of ClF₃ molecule according to VSEPR theory is:
(a) Trigonal planar (b) T-shaped (c) Trigonal pyramidal (d) See-saw

14. Which of the following molecules has a net dipole moment equal to zero?

(a) H_2O (b) NH_3 (c) CO_2 (d) NF_3

15. The bond order of O_2^+ species is:

(a) 2.0 (b) 2.5 (c) 1.5 (d) 3.0

16. Which type of hybridization is shown by the carbon atoms involved in a triple bond (e.g., in ethyne)?

(a) sp (b) sp^2 (c) sp^3 (d) dsp^2

Directions (Q17-Q18): Each of these questions contains an Assertion (A) followed by a Reason (R). Choose the correct option:

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

17. Assertion (A): Combustion of 16 g of methane (CH_4) produces 44 g of carbon dioxide (CO_2).

Reason (R): In a balanced chemical equation, mass is always conserved.

18. Assertion (A): The dipoles in BF_3 molecule cancel each other out completely.

Reason (R): BF_3 has a highly symmetrical trigonal planar geometry.

SECTION B: VERY SHORT ANSWER QUESTIONS (2 Marks Each)

19. Differentiate between a limiting reagent and an excess reagent with a suitable chemical reaction example.

20. Calculate the mass percent of different elements present in sodium sulphate (Na_2SO_4). (Atomic masses: Na = 23, S = 32, O = 16).

21. State Heisenberg's Uncertainty Principle. Write its mathematical expression and mention its physical significance for macroscopic objects.

22. Write the complete electronic configuration of Cu (Z=29) and Cr (Z=24). Explain why they show anomalous configurations.

23. Explain why the first ionization enthalpy of Nitrogen (N) is higher than that of Oxygen (O), despite Oxygen having a higher nuclear charge.

24. Draw the Lewis dot structures for the following polyatomic ions:

(a) CO_3^{2-}

(b) NH_4^+

25. Distinguish between a sigma (σ) bond and a pi (π) bond based on their mode of orbital overlapping and relative strength.

SECTION C: SHORT ANSWER QUESTIONS (3 Marks Each)

26. A compound contains 4.07% hydrogen, 24.27% carbon, and 71.65% chlorine. Its molar mass is 98.96 g/mol. Determine its empirical formula and molecular formula.

27. (a) State Hund's Rule of Maximum Multiplicity with an example. (1.5 Marks)

(b) What are the values of n , l , and m_l for an electron residing in a 4d orbital? (1.5 Marks)

28. Define Electronegativity. How does it differ from Electron Gain Enthalpy? Discuss its general periodic trend down a group and across a period.

29. Use the VSEPR model to predict the geometry, shape, and mention the number of lone pairs on the central atom for:

(a) SF_4

(b) XeF_4

(c) H_2O

30. (a) What is meant by hybridization? (1 Mark)

(b) Describe the hybridization of phosphorus in PCl_5 . Why are axial bonds longer than equatorial bonds in PCl_5 ? (2 Marks)

SECTION D: CASE-BASED QUESTIONS (4 Marks Each)

31. Read the following passage and answer the questions that follow:

The Bohr model of the atom was a major milestone, introducing quantized energy levels to explain line spectra, specifically the hydrogen emission spectrum. When an electron falls from a higher energy orbit (n_2) to a lower energy orbit (n_1), electromagnetic radiation of a precise frequency is emitted. However, the model failed to predict the spectra of multi-electron atoms and ignored the wave nature of matter. Later, Louis de Broglie suggested that all moving matter possesses wave characteristics, which was structurally validated by Quantum Mechanics.

(a) Calculate the frequency of radiation emitted when an electron falls from $n=4$ to $n=2$ in a hydrogen atom. (Given Rydberg constant, $R_H = 2.18 \times 10^{-18}$ J). (2 Marks)

(b) State two major limitations of Bohr's atomic model. (1 Mark)

(c) What will be the de Broglie wavelength of an electron travelling at 1% the speed of light? (Mass of electron = 9.1×10^{-31} kg). (1 Mark)

32. Read the following passage and answer the questions that follow:

Molecular Orbital (MO) Theory provides a sophisticated framework for understanding chemical bonding by constructing molecular orbitals from the linear combination of atomic orbitals (LCAO). Unlike Lewis structures, MO theory easily accounts for non-integral bond orders and predicts magnetic properties flawlessly. For homonuclear diatomic molecules of the second period, the filling order of molecular orbitals changes significantly past Nitrogen due to 2s-2p mixing dynamics.

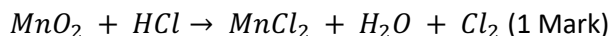
(a) Draw the Molecular Orbital energy level diagram for the dinitrogen molecule (N_2). (2 Marks)

- (b) Calculate the bond order of N_2 and predict its magnetic behaviour (paramagnetic or diamagnetic). (1.5 Marks)
- (c) How does the stability of N_2 change when it loses an electron to form N_2^+ ? (0.5 Marks)

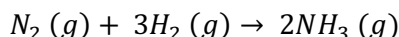
SECTION E: LONG ANSWER QUESTIONS (5 Marks Each)

33. From Chapter 1: Some Basic Concepts of Chemistry

- (a) Balance the following chemical equation by stoichiometric methods:



- (b) 50.0 kg of N_2 (g) and 10.0 kg of H_2 (g) are mixed to produce NH_3 (g) via Haber's process:



Identify the limiting reagent in this reaction and calculate the mass of NH_3 (g) formed. (4 Marks)

34. From Chapter 2: Structure of Atom

- (a) What are quantum numbers? Explain the physical significance of the Azimuthal quantum number (l) and Magnetic quantum number (ml). (2 Marks)
- (b) A photon of wavelength 4×10^{-7} m strikes a metal surface, the work function of the metal being 2.13 eV. Calculate:
- (i) The energy of the photon in eV.
 - (ii) The kinetic energy of the emitted photoelectron.
- (Given: $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$, $h = 6.626 \times 10^{-34} \text{ J.s}$, $c = 3 \times 10^8 \text{ m/s}$). (3 Marks)

35. From Chapter 4: Chemical Bonding and Molecular Structure

- (a) Define Resonance using the ozone (O_3) molecule as an example. Draw its resonating structures. (2 Marks)
- (b) What is meant by Hydrogen Bonding? Distinguish between intermolecular and intramolecular hydrogen bonding with one clear example of each. How does it affect the boiling point of a compound? (3 Marks)

P M SHRI K V SONEPUR
AUTUMN BREAK HOLIDAY HOMEWORK
CLASS XI – PHYSICS

Chapters: Laws of Motion • Work, Energy and Rotational Dynamics • Gravitation
(Solve the following in HW. Paste a print out of this sheet.)

Section A – Laws of Motion

1. A 5 kg block on a smooth horizontal surface is pulled by a 20 N horizontal force. Find its acceleration and velocity after 4 s if it starts from rest.
2. A 4 kg block is pulled horizontally with a force of 25 N. If the coefficient of kinetic friction is 0.20, calculate the frictional force and acceleration. Take $g = 9.8 \text{ m/s}^2$.
3. A 2 kg block rests on a rough horizontal surface with coefficient of static friction 0.4. Find the maximum static friction. Will a horizontal force of 6 N move it?
4. Two blocks of masses 3 kg and 2 kg are in contact on a frictionless table. A 15 N force pushes the 3 kg block towards the 2 kg block. Find the acceleration and contact force.
5. A 1,000 kg car moving at 20 m/s stops in 5 s. Calculate the average braking force and the distance travelled during braking, assuming uniform retardation.
6. A 60 kg person stands on a weighing machine in a lift accelerating upward at 2 m/s^2 . Calculate the reading in newtons. What will it read if the lift accelerates downward at the same rate?
7. A 0.02 kg bullet moving at 300 m/s embeds in a stationary wooden block of mass 2.98 kg. Find the common velocity immediately after impact.

Section B – Work, Energy and Rotational Dynamics

8. A 10 kg body is lifted vertically through 3 m at constant speed. Calculate the work done by the lifting force and the change in gravitational potential energy.
9. A 2 kg body moving at 10 m/s is brought to rest by a constant opposing force over 5 m. Calculate the work done by the force and its magnitude.
10. A spring of force constant 200 N/m is compressed by 0.10 m. Calculate the elastic potential energy stored.
11. A 1,200 kg car increases speed from 10 m/s to 20 m/s. Calculate the change in kinetic energy. If this change occurs in 5 s, find the average power.
12. A 2 kg particle moves under a force $F = 6x \text{ N}$ along the x-axis from $x = 0$ to $x = 2 \text{ m}$. Calculate the work done by integrating the force over displacement.
13. A uniform rod of length 2 m and mass 3 kg rotates about an axis through its centre and perpendicular to its length. Calculate its moment of inertia.
14. A solid disc of mass 4 kg and radius 0.5 m rotates at 10 rad/s. Calculate its moment of inertia and rotational kinetic energy.
15. A torque of 12 N m acts on a body with moment of inertia 3 kg m^2 . Find angular acceleration. If it starts from rest, find angular velocity after 4 s.
16. A wheel rolls without slipping with centre-of-mass speed 4 m/s and radius 0.4 m. Find its angular speed.

Section C – Gravitation

17. State Kepler's three laws of planetary motion. Explain why a planet moves faster near perihelion than near aphelion.

18. Calculate the gravitational force between masses 5 kg and 10 kg separated by 2 m. Use $G = 6.67 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2}$.
19. Derive the expression $g = GM/R^2$ for the acceleration due to gravity at the surface of a spherical planet.
20. At what height above Earth's surface will g become one-fourth of its surface value? Express the answer in terms of Earth's radius R .
21. Assuming uniform density, calculate g at a depth equal to $R/4$ below Earth's surface, in terms of surface gravity g .
22. Derive the expression for escape speed from a planet. Calculate Earth's escape speed using $g = 9.8 \text{ m/s}^2$ and $R = 6.4 \times 10^6 \text{ m}$.
23. A satellite moves in a circular orbit of radius $7.0 \times 10^6 \text{ m}$ around Earth. Calculate its orbital speed using $GM = 3.986 \times 10^{14} \text{ m}^3/\text{s}^2$.
24. A satellite has orbital radius r . What happens to its orbital speed and time period if the orbital radius is doubled? Give ratios.

Section D – Challenge Problems

25. A block of mass 2 kg is placed on a 30° rough incline with coefficient of kinetic friction 0.20 and slides down. Calculate its acceleration.
 26. A solid cylinder rolls without slipping down from a vertical height h . Using conservation of energy, obtain its speed at the bottom in terms of g and h .
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