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HYDERABAD REGION

Term I Examination (2025-26)

CLASS :XI   **SUBJECT : chemistry**

Max Time: 3 hrs.   **Max Marks: 70**

SET- I

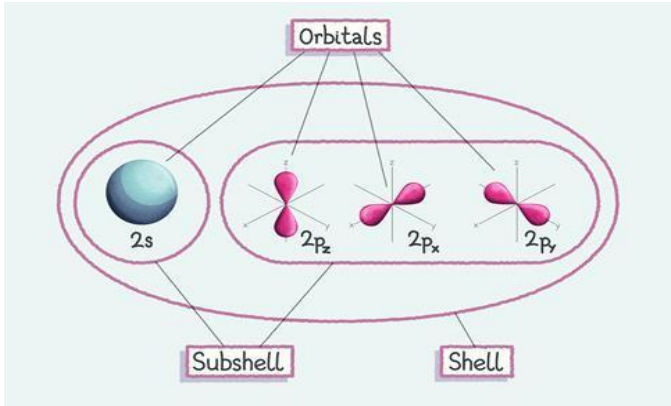
General Instructions:

i. There are 33 questions in this question paper with internal choice.
ii. SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
iii. SECTION B consists of 5 short answer questions carrying 2 marks each.
iv. SECTION C consists of 7 short answer questions carrying 3 marks each.
v. SECTION D consists of 2 case-based questions carrying 4 marks each.
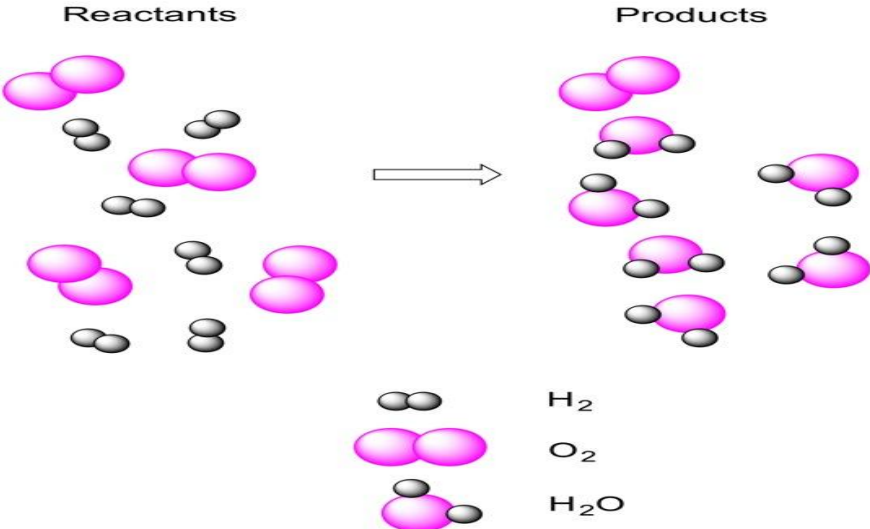vi. SECTION E consists of 3 long answer questions carrying 5 marks each.

SECTION A		
Select the most appropriate option out of the four choices given for each of the question.		
Q.No	**Question**	**Marks**
1.	Which of the following is not iso-electronic with Neon (a) O^{2-} (b) F^{-} (c) Ca^{2+} (d) Na^{+}	1
2.	Which of the following sets of quantum numbers is not possible? (a) n = 3, l = 0, m = 0 (b) n = 3, l = 1, m = -1 (c) n = 2, l = 0, m = -1 (d) n = 2, l = 1, m = 0	1
3.	-------is not a state function. a) entropy b) enthalpy c) work done d) free energy	1

4.	What is the mass percent of hydrogen in a water molecule? (a) 0.034% (b) 11.1% (c) 3.4% (d) 28.7%	1
5.	The correct increasing order of atomic/ionic radii is (a) N< Be< B (b) $F^- < O^{2-} < N^{3-}$ (c) K< Na<Li (d) $Fe^{3+} < Fe < Fe^{2+}$	1
6.	The empirical formula of a compound of molecular mass 120 is CH_2O. The molecular formula of the compound is : (a) $C_2H_4O_2$ (b) $C_4H_8O_4$ (c) $C_3H_6O_3$ (d) CH_2O	1
7.	Amongst H_2O and H_2S, the one with the highest boiling point is (a) H_2O because of intermolecular hydrogen bonding (b) H_2S because of higher molecular weight. (c) H_2S because of intermolecular hydrogen bonding. (d) H_2O because of the large bond angle.	1
8.	Which of the following rule out the existence of definite paths or trajectories of electrons. (a) Pauli's exclusion principle (b) Heisenberg's uncertainty principle (c) Hund's rule of maximum multiplicity (d) Aufbau's principle	1
9.	Which is not a unit of pressure: (a) Bar (b) N/m^2 (c) Kg/m^2 (d) Torr	1

10.	What is the change in internal energy ΔU, for a system that does 70 joules of work as it absorbs 45 joules of heat? (a) 115 J (b) 25 J (c) –25 J (d) –115 J	1
11.	Consider the following statements: I. The radius of an anion is larger than that of parent atom. II. The I.E. increases from left to right in a period generally. III. The electronegativity of an element is the tendency of an isolated atom to attract an electron. The correct statements are - (a)I alone (b) II alone (c) I and II (d) II and III	1
12.	If the concentration of glucose ($C_6H_{12}O_6$) in blood is 0.9 g/L, molarity of glucose in blood? a) 5M b) 50M c) 0.005 M d) 0.5 M	1

Question nos13. to 16. are Assertion-reason Questions: There are two statements- Assertion (A) and reason (R) in each question. Answer these questions by selecting the most suitable options 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(A) : Equal moles of different substances contain the same number of constituent particles. Reason(R) : Equal weights of different substances contain the same number of constituent particles.	1
14.	Assertion (A) : An orbital cannot have more than 2 electrons and their spin must be opposite. Reason (R) : No two electrons in an atom can have same set of all four quantum numbers.	1

15.	Assertion(A): The first ionization enthalpy of Aluminium is lower than that of Magnesium. Reason(R): The Ionic radius of Aluminium is smaller than that of Magnesium.	1
16.	Assertion (A) : Even though the central atom of both NH_3 and H_2O molecules are sp^3 hybridised, yet the H–N–H bond angle is greater than that of H–O–H. Reason (R) : This is because the nitrogen atom of NH_3 has one lone pair and oxygen atom of H_2O has two lone pairs.	1
	SECTION – B	
17.	State Aufbau principle.Write the electronic configuration of copper. **OR** Compare the electronic configuration of Nitrogen with Oxygen and explain how Hund's rule is applied.	2
18.	Find the de Broglie wavelength for an electron moving at the speed of $2.05 \times 10^7 ms^{-1}$ (Given: Mass of an electron = 9.1×10^{-31} kg & h = 6.6 x 10^{-34} Js)	2
19.	Draw the resonance structures of (i) Ozone molecule (ii) Carbonate ion	2
20.	A box contains some identical red coloured balls labelled as A each weighing 2grams and blue coloured balls labelled as B each weighing 5 grams.Consider the combination of AB and AB_2 to show that law of multiple proportion is applicable.	2
21.	Calculate the radius of Bohr's third orbit for Hydrogen atom.	2
	SECTION – C	
22.	a) Write the electronic configuration of Chromium. At. no.=24 b) Predict the position of the element in the periodic table satisfying the electronic configuration ns^2np^6 for n=2. c)Name the element with which Be shows a diagonal relationship.	3

23.	a)Draw the Lewis dot structure of BeF_2 and CO_2 b) Explain how PCl_5 violates octet rule. **OR** a) Explain with the help of suitable examples polar and nonpolar covalent bond. b)Write the condition for the stable ionic bonding with respect to lattice enthalpy.	3
24.	a) Write the values of all quantum numbers for the last electron in the element K (At.no.=19). b) Denote the orbitals with the following quantum numbers: i) n=1,l=0 ii) n=3,l=1 c) How many electrons can be filled in all the orbitals with n+l=5?	3
25.	a) Explain why H_2 is diamagnetic based on molecular orbital theory. b) Why He_2 cannot exist according to molecular Orbital Theory **OR** a).What is meant by the term bond order? b) Arrange the following species in the increasing order of stability on the basis of bond order, with the help of Molecular Orbital Theory -O_2, O_2^+,O_2^-	3
26	a) Find the energy of the photon having wavelength $0.50A^0$. b)What is meant by Photoelectric work function?	3
27	 a) How many subshells are filled in an atom of neon? b) Give the number of orbitals in the d subshell? c) Give the set of quantum numbers for an electron in a 3p orbital .	3

28.	1M solution of $NaNO_3$ has density $1.25g/cm^3$.Calculate its molality.	3
	OR	
	How many molecules approximately do you expect to be present in a small crystal of sugar($C_{12}H_{22}O_{11}$)which weighs 10 mg?	

| | **SECTION – D** | |

29.		4
	Reactants Products	
	H_2	
	O_2	
	H_2O	
	Many times, reactions are carried out with the amounts of reactants that are different from the amounts as required by a balanced chemical reaction.The reactant, which gets consumed first, limits the amount of product formed and is, therefore, called the limiting reagent.	
	Observe the above image and answer the following:	
	a) Calculate the masses of H_2 and O_2 required to produce 6 moles of water.	
	b)Which reactant is left unreacted and why?	
	c)Calculate the amount of H_2O (in grams) that is produced.	

30.	A system in thermodynamics refers to that part of the universe in which observations are made and the remaining universe constitutes the surroundings. The surroundings include everything other than the system. The system and the surroundings together constitute the universe. The wall that separates the system from the surroundings is called boundary. Every system is associated with a definite amount of energy, called the internal energy a) State the first law of thermodynamics. b) Define an isolated system c) Calculate the work done when a gas is compressed by a pressure of 0.5 atm so as to decrease its volume from 400cm3 to 200 **OR** a) What are intensive properties? b) What is the condition for a process to occur adiabatically? c) 2 litres of a gas expands isothermally against a constant pressure of 1atm until its volume is 10 litre.How much work is done?	4
	SECTION – E	
31.	a) Describe the hybridisation and geometry of PCl_5. b) Mention the shape of the following molecules using the VSEPR model: $BeCl_2$,H_2S. c) Illustrate the hybridisation in the Ethene molecule with the help of orbital overlapping diagram. How many sigma and pi bonds are there in it? **OR** a) What is the correct order of repulsion bp – bp, lp – lp, and lp – bp? (bp is bond pair, lp is lone pair). b) Draw the shape of the XeF4 molecule. c) How many bond pairs and lone pairs are there in the Ammonia molecule? d) Draw the molecular structure of Ethyne and mark the sigma and pi bonds in it.	5

32.	The first($\Delta iH1$)and second ionisation($\Delta iH\,2$)enthalpies and electron gain enthalpies(ΔegH) of few elements are given below:	5

ELEMENT	$\Delta iH\,1$	$\Delta iH\,2$	ΔegH
I	520	7300	-60
II	419	3051	- 48
III	1681	3374	-328
IV	1008	1846	-295
V	2372	5251	+48
VI	738	1451	- 40

Which of the following elements is most likely to be :

a) the least reactive element

b) the most reactive metal

c) the most reactive non metal

d) an alkaline earth metal

e) the metal which is likely to be an alkali metal with smaller atomic number.

Justify your answers.

33.	(a) Predict the entropy change in-	5

(i) A liquid crystallizes into solid

(ii) Temperature of a crystallise solid raised from OK to 115K

(b) Calculate the enthalpy change for the process- $CCl_4(g) \rightarrow C(g) + 4\,Cl(g)$

and calculate bond enthalpy of C – Cl in $CCl_4(g)$.

$\Delta vapH^0\,(CCl_4) = 30.5$ kJ mol^{-1}

$\Delta f\,H^0\,(CCl_4) = -135.5$ kJ mol^{-1}

$\Delta aH^0\,(C) = 715.0$ kJ mol^{-1}

$\Delta aH\,(Cl_2) = 242$ kJ mol^{-1}

where ΔaH^0 is standard enthalpy of atomisation, $\Delta vapH^0$ is standard enthalpy of vapourisation and $\Delta f\,H^0$ is standard enthalpy of formation.

OR

(a) For the reaction, $2 \, Cl(g) \longrightarrow Cl_2(g)$, what are the signs of ΔH and ΔS ?

(b) Calculate the standard enthalpy of formation of CH3OH(l) from the following data:

$CH_3OH \, (l) + 3/2 \, O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$;

$\Delta_r H^0 = -726 \, kJ \, mol^{-1}$

$C(graphite) + O_2(g) \rightarrow CO_2(g)$;

$\Delta_c H^0 = -393 \, kJ \, mol^{-1}$

$H_2(g) + 1/2 \, O_2(g) \rightarrow H_2O(l)$;

$\Delta_f H^0 = -286 \, kJ \, mol^{-1}$

where $\Delta_r H^0$ is standard enthalpy of reaction, $\Delta_c H^0$ is standard enthalpy of combustionand and $\Delta_f H^0$ is standard enthalpy of formation.