PART (B) : CHEMISTRY

SECTION – I : SINGLE CORRECT ANSWER TYPE
(Maximum Marks : 30)

This section contains 10 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which ONLY ONE is correct.

Marking Scheme : +3 for correct answer, 0 if not attempted and -1 in all other cases.

21. The ionisation energy of Zn is :-
(A) More than Cu and Ga
(B) Less than Cu and Ga
(C) More than Ga and less than Cu
(D) More than Cu and less than Ga

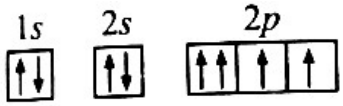
22. If *YZ* plane contain all the atoms of formaldehyde (H_2CO), find the nodal plane of π-bond in formaldehyde.
(A) *XY*
(B) *YZ*
(C) *XZ*
(D) Not predictable

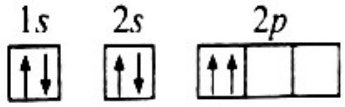
23. Naturally occurring thallium consists of two stable isotopes, Tl-203 and Tl-205 (atomic mass = 203.0 and 205.0, respectively) and has an average atomic mass of 204.4. What is percentage of Tl – 205?
(A) 14.0 %
(B) 30.0 %
(C) 50.0 %
(D) 70.0 %

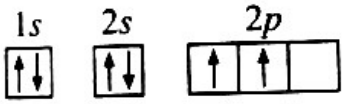
24. A solution containing 12.0 % NaOH by mass has a density of 1.131 g/mL. What volume of this solution contains 5.00 mol of NaOH?
(A) 0.0240 L
(B) 1.67 L
(C) 1.47 L
(D) 1.00 L

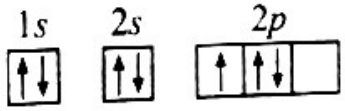
25. The antacid "Milk of Magnesia" is an aqueous slurry of magnesium hydroxide containing about 80 mg $Mg(OH)_2$ per mL. What volume of gastric juice which is about 0.17 mol/L HCl can be neutralized by 1 table spoon (15 mL) of Milk of Magnesia?
(A) 0.242 L
(B) 0.00122 L
(C) 0.0611 L
(D) 0.122 L

26. What possibly can the ratio be of the de Broglie wavelengths for two electrons having the same initial energy and accelerated through 50 volts and 200 volts?
(A) 3 : 10
(B) 10 : 3
(C) 1 : 2
(D) 2 : 1

27. Which electronic configuration represents a violation of **Hund's rule**l and **Pauli's rule both** for an atom in its ground state?
(A) 

(B) 

(C) 

(D) 

28. An electron cannot have the quantum numbers n = ……, l = ……, m_l = …….. .
(A) 1, 1, 1
(B) 2, 0, 0
(C) 3, 2, 1
(D) 2, 1, –1

29. Assuming Heisenberg Uncertainity Principle to be true what could be the minimum uncertainity in de-Broglie wavelength of a moving electron accelerated from rest by Potential Difference of 6 V whose uncertainty in position is $\frac{7}{22}$ nm.
(A) 6.25 Å
(B) 6 Å
(C) 0.625 Å
(D) 0.3125Å

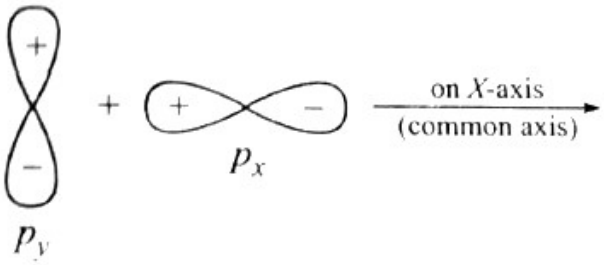
30. Total no. of lines in Lyman series of H spectrum will be _____ if de-excitation occurs from n^{th} orbit
(A) n
(B) $n - 1$
(C) $n - 2$
(D) $n\,(n + 1)$

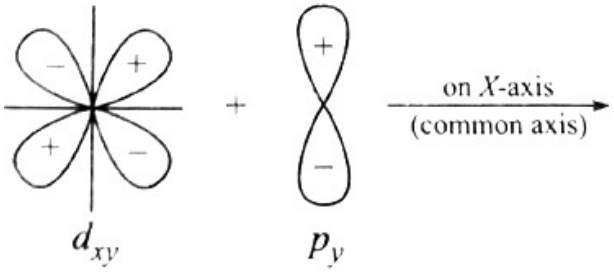
SECTION – II : MULTIPLE CORRECT ANSWER TYPE
(Maximum Marks : 20)

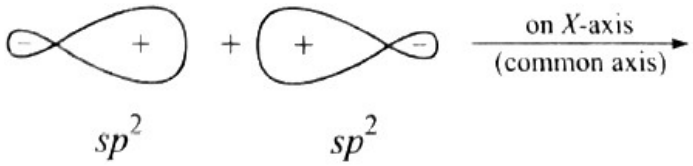
This section contains 5 multiple choice questions. Each question has 4 options (A), (B), (C) and (D) for its answer, out of which ONE OR MORE than ONE option can be correct.
Marking Scheme : +4 for correct answer, +1 Partial Mark, 0 if not attempted and -1 in all other cases.

31. As per Valence Bond Theory (V.B.T.), which of the following overlapping is/are possible?

(A) $d_{xy} + d_{xy} \xrightarrow[\text{(common axis)}]{\text{on } X\text{-axis}}$

(B) 

(C) 

(D) 

32. Select correct option regarding Uuh (atomic number 116)
(A) It belongs to 7th period element
(B) It belongs to group 16 element
(C) It is p-block element
(D) It is an inert gas

33. Select correct statements.
(A) Bond length of $\overset{+}{N}O$ > NO
(B) Bond order of $\overset{+}{N}O$ > NO
(C) Bond energy of NO > $\overset{+}{N}O$
(D) NO is paramagnetic but $\overset{+}{N}O$ is diamagnetic

34. Correct order of acidic strength :-
(A) $HNO_2 > HNO_3$
(B) $H_2SO_4 > H_2SO_3$
(C) $HClO_3 > HBrO_3 > HIO_3$
(D) $H_3PO_2 > H_3PO_4 > H_3PO_3$

35. Which of the following molecule(s) does not have existence?
(A) IBr_7
(B) PH_5
(C) SH_6
(D) BI_3

SECTION – III : INTEGER ANSWER TYPE
(Maximum Marks : 10)

This section contains 5 questions. The answer to each question is a **SINGLE DIGIT INTEGER ranging from 0 to 9, BOTH INCLUSIVE.**
Marking scheme: +2 for correct answer, 0 if not attempted and 0 in all other cases.

36. Write the total number of elements (upto atomic number = 10), which have positive electron gain enthalpy (EGE_1).

37. Choose the number of correct statement(s) from the following:
(a) Ist ionisation potential of 'B' is higher than that of 'Be'.
(b) Electron affinity of 'O' is higher than that of 'S'.
(c) [Ar] $4s^2\ 3d^3$ is the electronic configuration of Mn^{2+}.
(d) IInd ionisation potential of Na > Ist ionisation potential of Na.
(e) Ist ionisation potential of N > IInd ionisation potential of N.
(f) Eletronagativity of Cl > Electronegativity of F.
(g) $C \rightarrow C^{2+}$ change is called IInd ionisation potential of carbon.
(h) Energy is required to convert $He \rightarrow He^-$.
(i) Conversion of $O \rightarrow O^{2-}$ is exothermic.

38. Sum of $p\pi - d\pi$ bonds in $SO_2(g)$ and $SO_3(g)$ is :

39. Number of lone pair – bond pair repulsion at 90° are (P) in I_3^-.
Number of lone pair – bond pair repulsion at 90° are (Q) in ICl_4^-.
Find difference of (P) and (Q).

40. Total number of faces in SF_5^+ ion polyhedron is :