

2021

Time : 3 hours

Full Marks : 50

Pass Marks : 23

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

*Answer any **five** questions, selecting at least **one** from each Group. Q. No. 1 is compulsory.*

1. Select the correct answer of the following :

1×10 = 10

(a) Wavelength for IR region lies between :

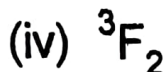
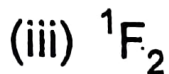
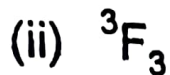
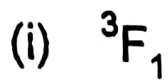
(i) 10 nm – 100 pm

(ii) 10 m – 1 cm

(iii) 1 cm – 100 μm

(iv) None of these

(b) The ground state term symbol for d^2 configuration is :



(c) Heisenberg uncertainty principle rules out the exact simultaneous measurement of :

(i) Probability and intensity

(ii) Energy and velocity

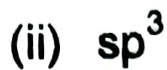
(iii) Charge density and radius

(iv) Position and velocity

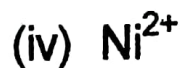
(d) Which molecule has linear structure ?



(e) In I_3^- ion, the hybridization is :



(f) Which of the following ions has highest value of magnetic moment ?



(g) Which of the following complex ions does not possess tetrahedral structure ?



(h) The hybridization of Xenon atom in XeF_4 is :

(i) sp^2

(ii) sp^3d

(iii) dsp^2

(iv) sp^3d^2

(i) Which of the following is a pseudohalogen ?

(i) IF_7

(ii) $(\text{CN})_2$

(iii) ICl_2

(iv) I_3^-

(j) Dimethylglyoxime is the specific reagent for the test of :

(i) V

(ii) Na

(iii) Al

(iv) Ni

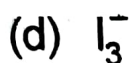
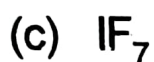
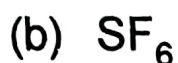
Group – A

2. (a) State and explain de Broglie equation for wave particles duality of electrons.

(b) Discuss the verification of de Broglie relation. 5+5 = 10

3. Predict the geometry of the following with the help of Hybridization and VSEPR theory :

2×5 = 10



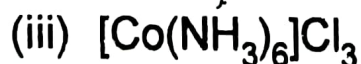
4. (a) Explain the following : 3+3 = 6

(i) Chelate and chelate complexes

(ii) Effective atomic number

(b) Give IUPAC names of the following :

1×4 = 4



Group – B

5. (a) Explain the following : $2\frac{1}{2} \times 2 = 5$
- (i) All inert gases are monoatomic
 - (ii) The radius of noble gas is the highest in a series
- (b) What are pseudohalogens ? Explain with examples. 5
6. Discuss the chemistry of Titanium with respect to the following : $2\frac{1}{2} \times 4 = 10$
- (a) Position in P. T.
 - (b) Oxidation states
 - (c) Complex formation
 - (d) Acid – Base nature of its compounds
7. Give reasons for the following : $2\frac{1}{2} \times 4 = 10$
- (a) Graphite is good conductor of electricity whereas Diamond is bad conductor of electricity.
 - (b) SiCl_4 is hydrolysed but CCl_4 is not.

- (c) CO_2 exists in gaseous state while SiO_2 exists in solid state
- (d) H_2O is liquid but H_2S is gas at room temperature.

Group – C

8. (a) What is the spectral range of IR Spectroscopy? 4
- (b) Write any three applications of IR Spectroscopy. 6
9. Discuss the application of any two of the following reagents in Inorganic analysis :
5+5 = 10
- (a) EDTA
- (b) α -Nitroso – β -Naphthol
- (c) Cupferron
10. Discuss the chemistry involved in the manufacture of cement or glass. 10

