Subject: **Chemistry**
Paper name: **Inorganic Chemistry-III**
Paper No: **IX**
Semester: **VI**

A. Multiple choice questions [25 (5 from each unit)]

1. In deoxyhemoglobin, the oxidation state of iron is
   a) +3
   b) +2
   c) +1
   d) 0

2. The shape of $Fe(CO)_5$ is
   a) square planar
   b) square pyramidal
   c) trigonal bipyramidal
   d) octahedral

3. Which one of the following is not an organometallic compound?
   a) CH_3MgBr
   b) $(CH_3)_2SnCl_2]$
   c) $Al(OCH_3)_3$
   d) $(C_2H_5)_4Pb$

4. An organometallic bond is defined as the bond between
   a) a metal and a nonmetal
   b) a carbon and a metal.
   c) a carbon and a nonmetal
   d) a carbon and a metalloid

5. Which is not true about metal carbonyls?
   a) Here CO acts as a Lewis base as well as Lewis acid
   b) Here metal acts as Lewis base as well as Lewis acid
   c) Here dπ-pπ back bonding takes place
   d) Here pπ-pπ back bonding takes place

6. Which of the following metalloenzymes contain zinc
   a) Carbonic anhydrase

b) Carboxy peptidase
c) None of above
d) All of the above

7. Silicones resemble inorganic polymers in having high % of:
   a) Ionic character of Si-O bond
   b) Organic groups on silicon atoms
   c) Controlled hydrolysis
   d) Solubility

8. Side chains of porphyrin are
   a) Methyl and vinyl
   b) Propionyl and acetyl
   c) Ethene
   d) Both A and B

9. Myoglobin binding of oxygen depends on:
   a) the oxygen concentration (pO2)
   b) the hemoglobin concentration
   c) the affinity of myoglobin for the O2 (K)
   d) a) and c)

10. In Hemoglobin and Myoglobin iron is present as
    a) Fe(II)
    b) Fe(III)
    c) Fe(IV)
    d) Fe(VI)

11. In addition to uranium, which other actinide occurs naturally in significant amounts?
    a) Actinium
    b) Plutonium
    c) Protactinium
    d) Thorium

12. Which is the most common oxidation state of actinides in its compounds
    a) +3
    b) +4
    c) +5
    d) +6

13. Which of the following is general electronic configuration of actinides?
    a) [Rn] $5f^{0-14}6d^{0-1}7s^2$
    b) [Rn] $5f^{1-14}$ $6d^{0-14}7s^2$
    c) [Rn] $5f^{0-14}6d^{2}7s^2$
    d) [Rn] $5f^{16}d^{2}7s^0$

14. The actinides Exhibit more member of oxidation states in general than the lanthanides. This is because of small energy difference between:
    a) 3d and 4d
    b) 4f and 5f
    c) 5f and 6d
    d) None of the above

15. Which one of the following shows oxidation state up to + 7?
    a) Am
    b) Pu
    c) U
    d) Cm

16. Example for dia-magnetic materials:
    a) super conductors
    b) alkali metals
    c) transition metals
    d) Ferrites

17. The parallel alignment of atomic dipoles throughout large volumes of the substance results
    a) Diamagnetic
    b) Ferromagnetic
    c) Paramagnetic
    d) Non of above

18. Example for ferro-magnetic materials
    a) Iron, Cobalt, Nickel
    b) Zinc, Copper, Molybdenum
    c) Vanadium, Titanium, Manganese
    d) Sodium, Potassium, Lithium

19. The magnetic materials follow which law?
    a) Faraday’s law
    b) Ampere law

c) Lenz law
d) Curie Weiss law

20. Example for ferri-magnetic materials
    a) salts of transition elements
    b) rare earth elements
    c) transition metals
    d) Ferrites

21. The number of normal modes of vibration for ClO_3 molecule is
    a) 3
    b) 4
    c) 5
    d) 6

22. Which one is correct when assigning the stretching frequencies of bridging (n*b*) and terminal (n*t*) M-X bonds in metal-halogen compounds?
    a) nb are generally lower than nt
    b) nb are generally higher than nt
    c) nb are generally equal to nt
    d) nb may be lower or higher than nt

23. The vibrations without a centre of symmetry are active in
    a) IR but inactive in Raman
    b) Raman but inactive in IR
    c) Raman and IR
    d) None of the above

24. For a non-linear molecule, the number of modes of vibration is given by
    a) 2n - 4
    b) 3n - 6
    c) 3n - 5
    d) None of the above

25. How many fundamental vibrational frequencies can be observed in the infrared absorption spectrum of N2O?
    a) 2
    b) 3
    c) 4
    d) 6

B. Fill up the blanks [15 (3 from each unit)]

1. Myoglobin is found in _____ tissues
2. Hemoglobin is tetrameric hemoprotein, while myoglobin is _____ protein
3. Sodium-potassium pump is an ATPase found in the _____of animal cells.
4. π acid ligands are the one which are capable of _____ electron from metal atom in to its π or π^* vacant orbital
5. Triaryl boron compounds are mild _____ acid.
6. RMgX compounds are also known as _____ reagents.
7. The most common oxidation states of lanthanides are _____
8. The lanthanides which shows +2 oxidation state is _____
9. The elements of second and third transition series resemble each other more closely than the elements of first and second transition series due to _____
10. The forces opposing alignment of the dipoles with the external magnetic field are thermal in origin and thus weaker at _____ temperatures.
11. The Curie temperature is the one at which ferromagnetic material turn to _____ on heating.
12. The most suitable spectroscopy for the study of hydrogen bonding is _____ spectroscopy
13. frequency of the vibration will decrease as the mass of the halogen atom _____
14. The M-X stretching frequency of metal halogen compounds will be _____ for metal with higher oxidation number.
15. For a molecule to be IR active there must be a change in _____ as a result of the vibration that occurs when IR radiation is absorbed.

Key Answers

A. Multiple choice questions [replace x]

1. b	2. c	3. c	4. b	5. d	6. b	7. a
8. d	9. a	10. a	11. d	12. a	13. a	14. c
15. b	16. a	17. b	18. a	19. d	20. c 21. d	22. a
23. c	24. b	25. b				

B. Fill up the blanks [replace x]

1. muscles
2. monomeric
3. plasma membrane
4. accepting
5. Lewis

6. Grignard
7. +3
8. Eu or Europium
9. Lanthanide contraction
10. low
11. paramagnetic
12. IR
13. increases
14. higher
15. dipole moment