Electronic Spectra of
Transition Metal Complexes

1. Electronic spectra of transition metal complex observed in ..... region.
   a) 1R
   b) UV
   c) visible
   d) UV-visible

2. Electronic spectra of transition metal complexer give the information of ..... of transition metal complexes.
   a) colour
   b) magnetic properties
   c) Tendency to form soluble complex
   d) All above

3. Metal complex absorb the light in the visible region .....
   a) 100-200 nm
   b) 200-250 nm
   c) 400-700 nm
   d) 800-1200 nm

4. The spectra of coloured solution of transition metal complexes is measured by using.....
   a) Spectrophotometer
   b) Conductometer
   c) pH meter
   d) lonometer

5. Spectrophotometer is based on the principle of .....
   a) Ostwald's law
   b) Lambert's - Beer's law
   c) Ostribution law
   d) None of the above

6. Which of the following is the type of electronic transition.....
   a) d-d transition
   b) LMCT
   c) MLCT
   d) All of the above

7. Purple colour of $\left[Ti\left(H_2O\right)_6\right]^{3+}$, Blue colour of $\left[Cu\left(NH_3\right)_4\right]^{2+}$ and pink colour of $\left[CoF_6\right]^{3-}$ is / are dueto .....
   a) d-d transition
   b) LMCT
   c) MLCT
   d) interligand transition

8. Intense red colour of $\left[Fe\left(SCN\right)_6\right]^{3-}$

   Yellow colour of K_2CrO_4

   Yellow brown colour of $\left[Fe\left(H_2O\right)_5 OH\right]^{3+}$

   Dark purple colour of $KHnO_4$,
   Intense colour of [V(Ben30 hydroxidic acid)],
   Intense colour of [Fe (N-phenyl hydroximic acid)],
   orange colour of $K_2Cr_2O_7$
   is/are due to .....

a) d-d transition **b) LMCT**

c) MLCT d) interligand transition

9. Bright yellow colour of $[Cu(Phen)_2]$, colour of metal carbonyl such as $Ni(CO)_4$, $Fe_2(CO)_9$ and $[Fe(dipy)_3]^{2+}$ is / are due to.....

a) d-d transition b) LMCT

c) MLCT d) interligand transition

10. During the transition between the energy levels, an electron does not change its spin i.e. $\Delta S = 0$ is the statement of .....

a) spin selection rule b) orbital selection rule (Laporte rule)

c) Both a & b d) None of the above

11. Which of the following is Laporte selection rule.

a) $\Delta 1 = \pm 1$ b) $\Delta 1 = 0$

c) Both a and b d) None of thes above

12. Spectroscopic ground state term symbol of d^1 configuration is.....

a) $^2D_{\frac{3}{2}}$ b) $^2F_{\frac{3}{2}}$

c) $^2D_{\frac{2}{3}}$ d) $^2F_{\frac{2}{3}}$

13. Spetroscopic ground state term symbol of ..... configuration.

(for oxygen) $d^2 = {}^4F_{\frac{3}{2}}$

$d^2 = {}^3F_2$

$d^8 = {}^3F_4$

oxygen = $^3P_2$

$V^+ = {}^4F_{\frac{3}{2}}$

14. Orgel energy level digram is widely used for ..... complexes

a) Weak ligand b) strong ligand

c) Both a and b d) None of the above

15. Hole formulation concept observed in .....

a) $\left[ri\left(H_2O\right)_6\right]^{3+}$ **b)** $\left[Cu\left(H_2O\right)_6\right]^{2+}$

c) Both a & b d) none of the above

16. The electronic sepctra of $\left[Ti\left(H_2O\right)_6\right]^{3+}$ show only one band with a peak at .....

a) 20300 cm^{-1} b) 10150 cm^{-1}

c) 25600 cm^{-1} d) 30600 cm^{-1}

17. $\left[Ti\left(H_2O\right)_6\right]^{3+}$ ion absorb ..... and abear purple.

a) Red visible light **b) Green-yellow visible light**

c) Violet visible light d) Blue visible light

18. Ground state term symbol for He (16^2) is.....

a) $^1S_{\frac{1}{2}}$ **b)** $^1S_0$

c) $^0S_{\frac{1}{2}}$ d) none of these

19. For L = 0 and S = 1 full spectroscopic term is .....

a) $^5D_1$ b) $^1S_1$

c) $\mathbf{^3S_1}$ d) $^1P_3$

20. Ground state for $2P^3$ is.....

a) $^4S_3$ b) $^3F_4$

c) $^4S_{\frac{5}{2}}$ d) $^2P_1$

21. Which of the following corruspoun to absorption beak of maximum wave number in $\left[Cr\left(H_2O\right)_6\right]^{3+}$ complex 100?

a) $^4A_{2g} \longrightarrow {}^4T_{2g}(F)$ **b)** $^4A_{2g} \longrightarrow {}^4T_{1g}(P)$

c) $^4A_{2g} \longrightarrow {}^4T_{1g}(F)$ d) $^4A_{2g}(F) \longrightarrow {}^4T_{1g}(F)$

22. Solution of $\left[COCl_4\right]^{2-}$ are deep blue because.....

a) it is tetrahedral ion b) it has d^7 configuration

c) its transition in blue spectrum **d) its transition is** $^4A_2(F) \longrightarrow {}^4T_2(P)$

Coordination Theory (Part - Second)

1. Valence bond theory of coordination compound was put by the scientist .....
   a) Pauling and slater b) G.M. Lewis
   c) Van vleck d) Pearson
2. Valence bond theory of coordination explain .....
   a) Formation of coordination compound b) Stereosomerism
   c) Magnetic properties **d) All of the above**
3. According to valence bond theory of coordination compound the nd orbital involved in hybridisation maybe.....
   a) Only inner orbitals b) Only outer orbitals
   c) Inner orbitals or outer orbitals d) None of the above
4. Which of the following pair is correct?
   a) Coordination no. 4 - dsp^2 b) coordination No. 6 - d^2sp^2
   c) Coordination no. 7 - $d^3sp^3|$ **d) All above pairs are correct**
5. d^2sp^3 and sp^3d^2 type of complexes are also known as.....
   a) inner orbital complexes b) Outer orbital complexes
   c) Both inner and outer orbital complexes d) None of the above
6. Inner orbital complexes are also known as low spin complexes because.....
   a) Complex having less No. of unpaired electrons
   b) Complex having maximum No. of unpaid electrons
   c) Both a & b d) Can't say
7. $\left[Fe(CN)_6\right]^{-3}$ is an example of.....
   a) inner orbital complexes b) Outer orbital complexes
   c) Sandwitch complexes d) Crown ether
8. Hybridisation in $\left[Fe(CN)_6\right]^{-3}$ is.....
   a) d^2sp^3 b) dsp^2
   c) dsp^3 d) d^3sp^3
9. Magnetic nature of $\left[Fe(CN)_6\right]^{-3}$ is .....
   a) Paramagnetic b) Dimagnetic
   c) Ferromagnetic d) Antiferromagnetic
10. Outer orbital complexes are also known as high spin complexes because.....
    a) Complex having less No. of unpaired electrons
    b) Complex having maximum No. of unpaid electrons

c) Both a & b
d) None of the above

11. $[FeF_6]^{-3}$ is an example of .....

a) Inner orbital complexes
b) Outer orbital complexes
c) Sandwitch complexes
d) Crown ether complexes

12. Hybridisation in $[FeF_6]^{-3}$ is .....

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

13. Magnetic nature of $[FeF_6]^{-3}$ is.....

a) Paramagnetic
b) Dimagnetic
c) Ferromagnetic
d) Antiferromagnetic

14. Inner and outer orbital complexes respectively known as.....

a) d^2sp^3 and sp^3d^2 complexes
b) Lowspin and high spin complexes
c) Spin paired and spin free complexes
d) All above are correct

15. Limitahon of VBT (Valence bond theory) of coordination compound is/are.....

a) Fail to explain splitting of d orbitals
b) Fail to interpret spectra of complex
c) Fail to predict the relative energies of complexes
d) All of the above

16. eg orbital is a set of.....

a) *dxy, dxz, dyz* orbitals
b) dx^2y^2 & dz^2 orbitals
c) *dxy* & dz^2 orbitals
d) *dyz* & dx^2-y^2 orbitals

17. t_2g orbital is a set of.....

a) *dxy, dxz, dyz* orbitals
b) dx^2y^2 & dz^2 orbitals
c) *dxy* & dz^2 orbitals
d) *dyz* & dx^2-y^2 orbitals

18. t_2g orbitals.....

a) lie along with the axis
b) lie inbetween the axis
c) Both a & b
d) None of the above

19. eg orbitals .....

a) lie along with axis
b) lie in between the axis
c) Both a and b
d) None of the above

20. Crystal field theory (CFT) was put by the scientist.....

a) Huggins
b) Pauling
c) Shter
d) Bethe & Vanvleck

21. The correct statements of CFT is / are .....

a) Ligands are point charges

b) Attraction is purely electrostatic

c) Degeneracy of a orbital is destroyed when comples form

d) All above are correct

22. Axial orbitals of d-orbitals are.....

a) dx^2-y^2 **&** dz^2 b) *dxy, dxz* & *dyz*

c) *dxy* & dz^2 d) dx^2y^2 & *dyz*

23. According to CFT the bond between metal & ligand is.....

a) purely electrostatic b) Covalent

c) Metalic d) Coordinate bond

24. Under the influence of ligands d orbitals of metal ion split into.....

a) *dxy* & dz^2 **b) eg & t_{2g}**

c) eg & dx^2-y^2 d) t_{2g} & *dxy*

25. The splitting of degenerate d orbitals into two sets is known as.....

a) crystal field splitting b) ionisation energy

c) sublimation energy d) excitation energy

26. Crystal field splitting energy is denoted by .....

a) 10 Dq b) $1.0\ \Delta_o$

c) Both a and b d) None of the above

27. In octahedral complexes the energy of orbital is.....

a) eg > t_{2g} b) t_{2g} > eg

c) t_{2g} = eg d) cant say

28. Which CFSE is correct in octahedral cmplexes.....

a) d^2 = –4 Da b) d^2 = –8 Da

c) d^3 = –12 Da **d) All are correct**

29. CFSE of weak and strong field octaheral complexes respectively is.....

d^4 = –6 Dq and –16 Dq + P

d^5 = –0 Dq and –20 Dq + 2P

d^6 = –4 Dq + P and –24 Dq + 3P

d^7 = –8 Dq + 2P and –18 Dq + 3P

d^8 = –12 Dq + 3P and –12 Dq + 3P

d^9 = –6 Dq + 4P and –6 Dq + 4P

d^{10} = 0 + 5P Da and 0 Dq + 5P

30. In tetrahedral complexes the energy of orbital is.....

a) eg > t_{2g} **b) t_{2g} > eg**

c) t_{2g} = eg d) can't say

31. The comparison of energy of tetrahedral complexes with octahedral complexes is shown by equation....

a) $\mathbf{\Delta t = -\frac{4}{9}\ \Delta_0}$ b) $\Delta t = \frac{4}{9}\Delta_0$

c) $\Delta_0 = \frac{-4}{9}\Delta t$ d) $\Delta_0 = \frac{5}{9}\Delta t$

32. Low spin complexs of tetrahedral geometry have not yet been obtain, the reason is / are.....
    a) Not a single d orbital is along with axis b) Less no. of ligaod
    c) a correct **d) Both a & b correct**
33. Only high spin complexes are observed in tetrahedral complexes the reason is/are
    a) Not a single d orbital is along with axis b) Less no. of ligands
    c) Only a corred **d) Both a and b are correct**
34. The energy of tetrahedral complexes is less than octahedral complexes i.e. $\Delta t = \frac{-4}{9}\Delta_0$ the reason is.....
    a) Not a single d orbital is along with axis b) Less no. of ligands
    c) Only a corred **d) Both a and b are correct**
35. CFSE of tetrahedral complexes is as follows.....

Configuration	C.F.S.E. value
d^1	– 6 Dq
d^2	– 12 Dq
d^3	– 8 Dq
d^4	– 4 Dq
d^5	0 Dq
d^6	– 6 Dq + P
d^7	– 12 Dq + 2P
d^8	– 8 Dq + 3P
d^9	– 4 Dq + 4P
d^{10}	0 Dq + 5P

36. Splitting of d orbitals in tetragonal and square blanar complexes arises from.....
    a) Regular tetrahedral complexes b) Regular square planar complexes
    c) Regular octahedral cmplexes d) None of these
37. In tegragonal (elongated octahedral) complexes energy of orbital is.....
    a) ***$dx^2 - y^2$, dxy > dz^2, dxy, dyz*** b) *$dx^2 - y^2$, dxy < dz^2, dxy, dyz*
    c) *dxy dxz dyz > dz^2* d) *$dx^2 - y^2$, dxy = dz^2, dxy, dyz*
38. In square planar complexes energy of orbital is.....
    a) ***$dx^2 - y^2$, dxy > dz^2, dxy, dyz*** b) *$dx^2 - y^2$, dxy < dz^2, dxy, dyz*
    c) *dx^2y^2, dxz = dz^2, dxy, dyz* d) None of the above

39. Which of the following factors affecting the 10 Dg (magnitude of crystal field splitting)

a) Nature of ligand
b) Oxidation state of metalion
c) Size of d orbitals
d) Geometry of complexes
e) All are above correct

40. According to spectrochemical series which one of the following correct increasing order of strength of ligaods.

a) $Br^- < H_2O < CN^- < CO$
b) $CO < CN^- < H_2O < Br^-$
c) $Br^- < CO < H_2O < CN^-$
d) $CN^- < Br^- < H_2O < CO$

41. Which one of the following equation is correct about the crystal field splitting of cobalt ion.

a) Co (II) < Co (III)
b) Co (III) = Co(II)
c) Co (II) > Co (III)
d) All above are correct

42. Which one of the following is correct about crystal field splitting.....

a) 3d < 4d < 5d
b) 3d > 4d > 5d
c) 3d = 5d > 4d
d) 3d > 5d > 4d

43. According to CFT $\left[Ti(H_2O)_6\right]^{+3}$ complex ion show ..... colour

a) Purple
b) Green
c) Blue
d)

44. The colour of coordination compound is arises due to transition of electrons.....

a) S $\longrightarrow$ P
b) P $\longrightarrow$ d
c) d $\longrightarrow$ d
d) d $\longrightarrow$ F

45. The electronic configuration of $\left[Ti(H_2O)_6\right]^{3+}$ is.....

a) $t_{2g}^0 \ e_g^0$
b) $t_{2g}^1 \ e_g^0$
c) $t_{2g}^2 \ e_g^0$
d) $t_{2g}^3 \ e_g^0$

46. $\left[Ti(H_2O)_6\right]^{3+}$ absorb ..... radiation and show purple colour

a) I.R.
b) U.V.
c) Visible
d) Radio

47. When $\left[Ti(H_2O)_6\right]^{3+}$ absorb visible light resulting excitation of electron takes place from.....

a) $t_{2g}^1 \longrightarrow e_g^0$
b) $t_{2g}^0 \longrightarrow e_g^1$
c) $t_{2g}^1 \longrightarrow e_g^1$
d) $e_g^1 \longrightarrow t_{2g}^1$

48. According to CFT, how much unpaired electrons are present in $\left[CoF_6\right]^{3-}$ .....

a) 1 b) 2

c) 3 **d) 4**

49. According to CFT, how much unpaired electrons are present in $\left[Co\left(NH_3\right)_6\right]^{3+}$ .....

a) 0 b) 1

c) 2 d) 4

50. In octahedral complexes t_{29} orbitals are stabilized by.....

a) – 4 Dq OR – 0.4 Δ_o b) +6 Dq OR +0.6 Δ_o

c) 10 Dq OR 1.0 Δ_o d) none of these

51. In octahedral complese eg orbitals are destabilized by .....

a) – 4 Dq **b) +6 Dq**

c) Both d) None of these

52. In tetrahedral complexes eg orbital stabilised by.....

a) –6 Dq b) + 4 Dq

c) 10 Dq d) None of these

53. In tetrahedral complexes t_{2g} orbital destabilized by.....

a) –6 Dq **b) +4 Dq**

c) 10 Dq d) None of these

54. "Any non linear moleculer system in a degenerate electronic state will be unstable and will undergo some sort of distortion to lower its symetry and remove the degeneracy." is the statement of.....

a) Trans effect b) Bhol's effect

c) John-Teller effect d) None of these

55. The complex ion show the highest crystal field splitting energy is.....

a) $\left[CO\left(NH_3\right)_6\right]^{2+}$ b) $\left[CO\left(NH_3\right)_6\right]^{3+}$

c) $\left[Rh\left(NH_3\right)_6\right]^{3+}$ **d)** $\left[Ir\left(NH_3\right)_6\right]^{3+}$

56. Colour of complex is explained by.....

a) Werner's theory b) VBT

c) CFT d) Ligand field theory

57. Which of the following ligand having largest crystal field splitting?

a) F^- b) H_2O

c) NH_3 **d) CN^-**

58. Which of the following has maximum number of unpaired electrons?

a) d^6 (Tetrahedral) b) d^9 (octahedral)

c) d^7 (octahedral, High spin) d) d^4 (octahderal low spin)

59. Which of the following has smallest crystal field splitting?

a) $\left[CO(NH_3)_6\right]^{2+}$ b) $\left[CO(NH_3)_6\right]^{3+}$

c) $\left[Rh(NH_3)_6\right]^{3+}$ d) $\left[Ir(NH_3)_6\right]^{3+}$

60. The number of unpaired electrons, in $NiCl_4^{2-}$ (tetrahedral) is / are

a) 2 b) 0

c) 1 d) 4

61. Which of the following ligands having maximum crystal field splitting?

a) NH_3 b) F^-

c) $Oxalate^{2-}$ **d) CO**

62. The number of unpaired electron in a d^7 tetrahedral configuration is.....

a) 3 b) 2

c) 1 d) 7

63. Which of the following has no CFSE in octahedral field?

a) Fe^{3+} (High spin) b) CO^{3+} (Low spin)

c) Fe^{3+} (Low spin) d) Cr^{3+} (High spin)

64. Which of the following is correct?

a) Hydrated $CuSO_4$ is colourless

b) Anhydrated $CuSO_4$ in solid form is white

c) Hydrated $CuSO_4$ in solid form is white

d) $CuSO_4$ solution is yellow

Metal Cluster

1. Hydride of boron is commonly known as.....
   a) Boron **b) Boranes**
   c) Borazine d) All above
2. The boranes which baring the general formula B_nH_{n+4} is said to be.....
   a) Nido boranes b) Closo boranes
   c) Arachnoboranes d) All these
3. The boranes which having the general formula B_nH_{n+6} is said to be.....
   a) Nido boranes b) Closo boranes
   c) Arachnoboranes d) All these
4. The borones which having the formula $B_nH_n^{-2}$ is said to be.....
   a) Nido boranes **b) Closo boranes**
   c) Arachnoboranes d) All these
5. B_2H_6 .....
   a) Diborane (6) b) Diborane (2)
   c) Diborane (8) d) none of these
6. B_4H_{10}
   a) Tetraborane (10) **b) Tetraborane (14)**
   c) Tetraborane (14) d) Tetraborane (0)
7. $B_{10}H_{14}$
   a) Decarbone (14) b) Decaborane (10)
   c) Decarbonae (24) d) Decaborone
8. Diborane is prepared by .....
   a) $BCl_3 + H_2$ b) $BCl_3 + LiAlH_4$
   c) $BCl_3 + NaH$ **d) All these**
9. Diborane is .....
   a) rolatile gas b) nonvolatile gas
   c) liquid d) solid
10. Diborane on heating at 100-250°C, gires.....
    a) Boron b) Hydrogen
    c) Boron & Hydrogen **d) Mixture of hydrides**
11. Diborane on hydrolysis, gires.....
    a) mixture of boron **b) Boric acid**
    c) a and b d) none

12. Diborane is.....

a) Electron rich compound **b) Electron deficient compound**

c) both a and b d) None of these

13. Diborane show.....

a) Hydrogen bridge structure b) cage like structure

c) puckted 7ng structure d) All these

14. In diborane bond length between boron and bridging hydrogenation is.....

a) 1.33 A° b) 1.19 A°

c) 1.77 A° d) 1.00 A°

15. In diborane bona length between boron and terminal hydrogen atom is

a) 1.33 A° **b) 1.19 A°**

c) 1.77 A° d) 1.00 A°

16. In diborane bond length between two boron atom is.....

a) 1.33 A° b) 1.19 A°

c) 1.77 A° d) 1.00 A°

17. In diborane the bond angle between one boron atom and two bridging hydrogen atom is.....

a) 95° b) 120°

c) 180° d) 45°

18. In diborane the bond angle between one boron and two terminal hydrogen atom is....

a) 95° **b) 120°**

c) 180° d) 45°

19. Experimental evidences of hydrogen bndge structure of diborones is / are.....

a) NMR sturcutre b) Methylation

c) Specific heat **d) All these**

20. Three-centred electron pair bond is observed in....

a) diborane b) borazine

c) silicates d) fullerenes

21. How much three centied electron pair bond present in diboranes.....

a) Two b) Three

c) Four d) One

22. Banana type bond observed in....

a) diborane b) borazene

c) silicone d) silicates

23. In diborane each boron atom undergoes.....

a) Sphybridisation b) Sp^2 hybridisation

c) Sp^3 hybridisation d) dsp^2 hybridisation

24. B-H-B bridge in B_2H_6 is formed by the overlaping of .....

a) two centred one electrons **b) three centred two electrons**

c) four centred one electrons d) two centred two electrons

25. Mixed hydride of carbon and boron having both carbon and boron atoms in an electron deficient skeletal framework known as.....

a) boranes **b) carboranes**

c) hydrocarborane d) none of these

26. Which of the following is the type of carboranes....

a) Closo b) Nido

c) Arachno **d) All these**

27. Closo means .....

a) closed structure b) nest like structure

c) open structure d) none

28. Nido means .....

a) Nest like b) Cup like

c) open **d) All these**

29. Carboranes are derived from.....

a) hydrocarbon **b) beranes**

c) both a and b d) none of these

30. The formula of dicarbacloso dodecacaborane is.....

a) $C_2B_{10}H_{12}$ b) $C_2B_{12}H_{10}$

c) $C_2B_2H_6$ d) $C_2B_8H_{12}$

31. The structure of dicarbaclosododecaborane is.....

a) icosahedral b) Tetrahedral

c) Square planar d) Octahedral

32. $C_2B_{10}H_{12}$ occure in ..... isomeric form

a) Two **b) Three**

c) Four d) Five

33. Isometric form of $C_2B_{10}H_{12}$ are.....

a) Ortho b) Para

c) Meta **d) All these**

34. In meta $C_2B_{10}H_{12}$ carbon occuples the position.....

a) 1, 2 **b) 1, 7**

c) 1, 12 d) None of the above

35. In para $C_2B_{10}H_{12}$ carbon occupies the position.....

a) 1, 2 b) 1, 7

c) 1, 12 d) None of the above

36. Ortho $C_2B_{10}H_{12}$ is conrerted into meta $C_2B_{10}H_{12}$ at.....

a) 100°C **b) 470°C**

c) 700°C d) 1000° C

37. Meta $C_2B_{10}H_{12}$ is converted into para $C_2B_{10}H_{12}$ a^+ .....

a) 100°C b) 470°C

c) 700°C d) 1000° C

38. (m + 1) electron pairs are brosent in the structure of .....

a) closo carborane b) Nido carborane

c) Arachno carborane d) none of these

39. (m + 2) electron pairs are present in the structure of .....

a) closo carborane **b) Nido carborane**

c) Arachno carborane d) none of these

40. (m + 3) electron pairs are present in the structure of .....

a) closo carborane b) Nido carborane

c) Arachno carborane d) none of these

41. $C_2B_{10}H_{12}$ is isoelectronic with.....

a) $B_{12}H_{12}^{2-}$ b) $B_{12}H_{12}$

c) $B_{12}H_{10}^{-2}$ d) $B_{12}H_{10}$

42. $C_2B_{10}H_{12}$ & tbeir isomers are.....

a) White crystalline solid b) White amorphous solid

c) colourless liquid d) colourless gas

43. $C_2B_{10}H_{12}$ resist to attack.....

a) heat b) chemical

c) both a and b d) none of these

44. $C_2B_{10}H_{12}$ resistto attack.....

a) oxidising agent b) reducing agent

c) both a and b d) none of these

45. $C_2B_{10}H_{12}$ involved in reaction.....

a) Lithiation b) bromination

c) chlorination d) iodination

46. $C_2B_{10}H_{12}$ involved in the preparation of.....

a) Griganard derivate b) Amide deriradire

c) halogen derivation d) Acid derivative

47. Which of the following is the types of the boranes.....

a) Nido b) Arachno

c) Closo **d) All of the above**

48. STYX number of diborane is.....

a) 2002 b) 4012

c) 4020 d) 3203

49. Diborane, on treatment with aqueous KOH gives.....

a) orthoborate **b) Metaborate**

c) Both d) None

50. Diborane, on action with ammonia at low temp gives.....

a) Diammoniate of diborade b) Boron nitride

c) Borazine d) Carborane

51. Diborane, on action with ammonia at high temp. gives.....

a) Diammoniat of diborade **b) Boron nitride**

c) Borozine d) Borazole

52. Diborane, on treatment with ammonia, at 200°C gives.....

a) Diammoniate of diborane b) Boron nitrite

c) Borozine d) None

53. Metaloborane are.....

a) Polyhedral borane anion b) Polyhedral borane cation

c) Both a and b d) none of the above

54. Metaloborane having the general formula.....

a) B_nH_{n+4} b) B_nH_{n+6}

c) $B_nH_n^{-2}$ d) None of the above

55. Metaloborane is.....

a) Stable, aromatic, electron deficient compound

b) Unstable, aromatic, electron deficient compound

c) Stable, aliphatic, electron deficient compound

d) Unstable, aliphatic, electron deficient compount

56. Metaloborane is prepared by .....

a) Action of decaborane with triethylamine

b) Action of sodium boron hydride with diborane

c) Action of diborane with triethyl amine

d) All above

57. $B_{12}H_{12}^{2-}$ show.....

a) Tetrabedral structure b) Octahedral distorted

c) Icosahedral structure d) Prism structure

58. $B_{12}H_{12}^{2-}$ having.....

a) Two centred electron pair bond b) Three centred electron pair bond

c) Both a and b d) None of these

59. The number of electron in cage or icosahedral structure of metaloborane can be calculated by.....

a) Wade's rule b) EAN rules

c) Hunds rule d) Thumbs rule

60. Borazine react with excess bromine and gives

a) Benzene **b) Tribromobenzene**

c) both d) None of these

61. Borazine react with water and gives

a) Boric acid b) diborane

c) Benzene d) All these

62. On pyrolysis borazine gives

a) diphenyl like product b) Napthalene like protect

c) both d) None of these

63. Planar hexagonal ring structure is shown by

a) Borazine b) Methanol

c) both d) none of these

64. In boranzine the bond length between boron and nitrogen is

a) 0.144 nm b) 0.100 nm

c) 0.200 nm d) 0.215 nm

65. In borazine boron and nitrogen atom undergoes

a) SP hybridisation **b) SP^2 hybridisation**

c) SP^3 hybridisation d) dsp^2 hybridisation

66. According to Wade's rule the number of electrons present in framework of $B_{12}H_{12}^{2-}$ are.....

a) 24 b) 25

c) 26 d) 27

67. The compound of carborane with some metal ion called.....

a) Metalocarborane b) Metalobarane

c) Carborane d) None of the above

68. The trival name of $C_2B_9H_{11}^{2-}$ is.....

a) Carbollide **b) Dicabollide**

c) Carbinide d) None fo the above

69. Dicarbollide word derived from spanish word.....

a) Olla b) Bolla

c) Colla d) None of these

70. Which of the following compound form sandwith compound.....

a) Borane b) Carborane

c) Metalloborane **d) Metallocarborane**

Bio-Inorganic Chemistry

1. Which of the following elements are bulk element
   a) C b) H
   c) O **d) All of these**
2. Which of the following are trace elements.....
   a) Fe b) Cu
   c) Zn **d) All of these**
3. Which of the following are ultratrace elements.....
   a) F b) Se
   c) Si **d) All of these**
4. Na^+ and K^+ are.....
   a) Charge carrier b) Maintaine osmotic pressure
   c) Maintain sensityvity of nerve cells **d) All of these**
5. ..... essential codetituent of chlorophyll.
   a) Mg b) Na
   c) Mn d) All
6. Calcium is important for.....
   a) Bone b) Blood cloating
   c) Rhythm of heart beat **d) All of these**
7. Essential constituent of haemoglobin is.....
   a) Mg **b) Fe**
   c) Ca d) F
8. Wilson disease is caused by.....
   a) Exess of Fe b) Excess of Cr
   c) Excess of Cu d) Excess of Au
9. Cobalt is essential constituent of.....
   a) Vitamin A b) Vitamin C
   c) Vitamin K **d) Vitamin B_{12}**
10. Which of the following synthesize the insulin in pancres
    a) Co^{++} **b) Zn^{++}**
    c) Ni^{++} d) K^+
11. Which of the following causes the toxicity loss of hairs.....
    a) Se b) Te
    c) Po d) K

12. Which of the following has glucose tolerance factor.....

a) Cu^{++} b) CO^{+++}

c) er^{+++} d) Ca^{++}

13. itai-itai disease caused by the toxicity of.....

a) Cd^{++} b) Ag^{+}

c) Au^{++} d) Pt^{++}

14. Minamata disease caused by the toxicity of.....

a) Hg^{++} b) Cl^{-}

c) Br^{-} d) I^{-}

15. Deficiency of ..... causes Goiter.

a) F^{-} b) Cl^{-}

c) Br^{-} **d) I^{-}**

16. ..... maintain the balance between inside and outside the fluid of all

a) Na^{+} / K^{+} pump b) Ni^{++} / Co^{++}

c) Cr^{+++} / Fe^{++} d) Sn / Al

17. ..... essential for coagulation of blood and rythum of heart heat

a) Mg **b) Ca**

c) Sr d) Bg

18. In photosynthesis reaction ..... play an important role

a) Mg b) Ca

c) Br d) Ba

19. Porphin molecule is a ligand of ..... ring system

a) Tetrapyrol b) Tetra furon

c) Tetra thiophine d) None of these

20. The porphyrin ring with metal ion called.....

a) Carborane b) Metals carborane

c) Metaloborane **d) metaloporphyrine**

21. Metaloporphyrin of iron is / are.....

a) Chlorophyll b) Vitamin B_{12}

c) Haemoglobin & myoglobin d) none of these

22. Metaloporphirin of magnesium is.....

a) Chlorophyll b) Myoglobin

c) Cobalamine d) Haemoglobin

23. Metaloporphyrin of iron is.....

a) Haemoglobin b) Myoglobin

c) Cytochrome d)

24. Metaloporphitio of cobalt is.....

a) Haemogiobin b) Myoglobin

c) Cytochrome **d) Cobalamine or B_{12} vitamin**

25. Haemoglobin transport ..... & ..... to the different

a) O_2 & CO_2 b) O_2 & NH_3

c) CO_2 & SO_2 d) None of these

26. In heamoglobin ..... heme groups are attached on one globin molecule

a) 01 b) 02

c) 03 **d) 04**

27. Haemoglobin when attached to oxygen is called.....

a) Oxyhaemoglobin b) Deoxy haemoglobin

c) Both d) None of these

28. The binding of oxygen by haemoglobin is depends on.....

a) pH of blood b) Colour of blood

c) Smell of blood d) Complex nature of blood

29. At low pH and high concentration of CO_2 of blood the affinity for oxygen is.....

a) increases **b) decreases**

c) Cant say d) None of these

30. The effect of pH & con^n of CO_2 on binding and releasing of oxygen by haemoglobin is called....

a) Bohr's effect b) Common ion effect

c) Steric effect d) None of these

31. In deoxyhaemoglobin Fe^{++} is.....

a) low spin & parammagnetic **b) High spin & paramagnetic**

c) low spin & dimagnetic d) High spin & paramagnetic

32. In oxyhaemoglobin Fe^{+++} is.....

a) Lowspin & dimagnetic b) Lowspin & paramagnetic

c) Both a & b d) None of these

33. Myoglobin is .....

a) Musscle pigment b) catalyst

c) Both a & b d) None of these

34. In myoglobin ..... haeme group attached on globin molecule

a) 01 b) 02

c) 03 d) 04

35. Myoglobin store ..... in musscle

a) O_2 b) CO_2

c) Both a and b d) None of these

36. ..... actas oxygen reserviour within the musscle

a) Haemoglobin **b) Mycglobin**

c) Cytocbrome d) Cobalamine

37. Molecular weight of Haemoglobin is.....

a) 10,000 b) 20,000

c) 64,000 d) 100,000

38. Molecular weight of myoglobin is.....

a) 5,000 b) 10,000

c) 15,000 **d) 17,000**

39. ..... molecule consist of only one polypeptide chain of protein and one haeme group.....

a) Mroglobin b) Haemoglobin

c) Cytochrome d) none of these

40. Atmospheric nitrogen is.....

a) Very active **b) inert**

c) Both these d) None of these

41. Conversion of atmospheric nitrogen into useful nitrogeneous cmpound by natural or artificial method called.....

a) Nitration **b) Nitrogenfixation**

c) Both d) None of these

42. Which of the following way for the fixation of nitrogen is used.....

a) Lightening b) Blue green algae & bacteria

c) Both a & b d) None of these

43. The enzyme that is responsible for nitrogen fixation in microorganism is.....

a) Nitrogenase b) Cytochrome-c

c) Both a & b d) None of these

44. Nitrogenase is made up of with ..... protein.

a) one **b) two**

c) three d) four

45. Reduction of molecular nitrogen occur at site of .....

a) Fe b) S

c) Mo d) None of these

46. How much electrons required for conversion of nitrogen to ammonia by nitrogenase are.....

a) 2 b) 4

c) 6 d)

47. Smaller brotein of nitrogenase contain one.....

a) Fe_4S_4 b) Fe_2S_2

c) FeS d) Fe_3S_3

48. Larger protein or nitrogenase contain.....

a) 2 MO, 30 Fe, 30S b) 1 MO, 15 Fe, 15S

c) 2 MO, 50Fe, 50S d) 2 MO, 100Fe, 1000S

49. Nitrogenase convert atmospheric nitrogen to.....

a) Nitrate **b) Ammonia**

c) Both d) None of these