

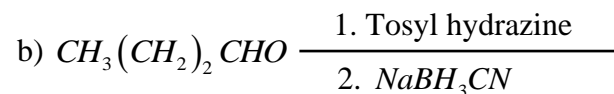
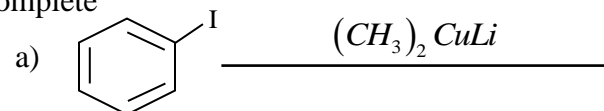
**ORGANIC CHEMISTRY – II**

Under CBCS – Credit 4

Time: **3** HoursMax. Marks: **75****SECTION – A****Answer ALL Questions :****(10 × 2 = 20)**

1. Hydrolysis of alkyl chloride occurs rapidly in the presence of iodide ion, but very slowly in the absence of it. Rationalize it.
2. An alkylbromide reacts with  $AgCN$  to give alkyl isocyanide while  $NaCN$  gives alkylcyanide Account it.
3. With suitable example write the steps involved in E1 mechanism.
4. Give the mechanism of Gattermann –Koch reaction.
5. How Wittig reaction helps in alkene formation.
6. Write the role of Grignard reagent in 1, 2 addition reactions.
7. Give two examples of Birch reduction.
8. What is meant by ene reaction. Give one example.
9. How  $O_5O_4$  helps in *cis*-diols formation.

10. Complete



## SECTION – B

**Answer ALL Questions :**

**(5 × 5 = 25)**

11. a) How aromatic nucleophilic substitution takes place by  $\text{ArS}_{\text{N}}1$  mechanism. Illustrate

**(OR)**

b) The exo-2-norbornyl tosylate reacts 350 times faster than endo-2-norbornyl tosylate. Account it.

12. a) Discuss ipso effect with examples.

**(OR)**

b) How Hofmann-Saytzeff rule helps in orientation of double bond.

13. a) Illustrate with examples Sharpless epoxidation reaction.

**(OR)**

b) How stereochemistry is maintained in addition of bromine to cis- and trans 2-butene.

14. a) Write the mechanism of Wolf Kishner reduction and Clemmenson reduction.

**(OR)**

b) Discuss the mechanism of Stobbe and Dieckmann condensation.

15. a) With suitable examples write the uses of  $\text{LDA}$  and  $\text{NaBH}_4$ .

**(OR)**

b) Write note on Wilkinson's catalyst.

## SECTION – C

**Answer any THREE Questions :**

**(3 × 10 = 30)**

16. a) When o-bromoanisole and m-bromoanisole reacts with  $\text{KHNH}_2$  in liq  $\text{NH}_3$  gives m-aminoanisole. why.

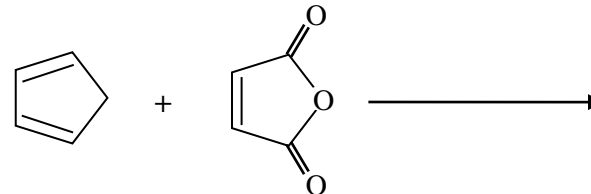
b) What happens when optically active alcohol reacts with thionylchloride. Reason out the product.

17. a) Discuss the pyrolysis of Chugaev reaction.

b) Explain Vilsmeier reaction.

18. a) Discuss the generation and reactions of enamine?

b) How Diels Alder reaction is stereoselective. Explain with



19. Discuss a) Fischer indole synthesis

b) Robinson annulations reaction

20. Explain the role of the following reagents in organic synthesis

a) DDQ

b) Crown ethers

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**M.Sc. Chemistry** Degree (Semester) Examinations, April 2016

Part – III : Core Subject : Second Semester : Paper – II

**INORGANIC CHEMISTRY – II**

Under CBCS – Credit 4

 Time: **3 Hours**

 Max. Marks: **75**
**SECTION – A**
**Answer ALL Questions :**
**(10 × 2 = 20)**

1. Explain the band intensities in electronic spectroscopy.
2. What is term symbol?
3. What is Trans effect?
4. State the Marcus theory.
5. Define: Wilkinson's catalyst.
6. What is meant by Tolman catalytic loops?
7. What are metal carbonyls?
8. Draw the structure of dinitrogen complexes.
9. What is meant by linear accelerator?
10. Define: Activation analysis.

**SECTION – B**
**Answer ALL Questions :**
**(5 × 5 = 25)**

- 11.a) Draw and explain with examples of Tanabe-Sugano diagram.

**(OR)**

- b) Write about the nephelauxetic ratio and series.

- 12.a) Explain about the classical magnetism.

**(OR)**

- b) Discuss in briefly the substitution reactions in octahedral complexes.

- 13.a) Write note on the synthetic gasolines.

**(OR)**

- b) Explain in briefly the Wacker process.

- 14.a) Discuss the structure and important reactions of metal carbonyls.

**(OR)**

- b) Write the preparation and bonding of dinitrogen complexes.

- 15.a) Explain the liquid drop model.

**(OR)**

- b) Give a brief account of isotope dilution technique.

**SECTION – C**
**Answer any THREE Questions :**
**(3 × 10 = 30)**

16. Discuss the following

- i) Racah parameters                      ii) charge transfer spectra

17. Compare the dia, para and ferromagnetism and anti-ferromagnetism.

18. Describe about the synthesis, structure, bonding and reactivity of metallocene.

19. Discuss in detailed the preparation, structure, bonding and important reactions of metal nitrosyls.

20. Explain the following

- a) GM counter
- b) Scintillation counter                      c) Si solid state counter

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**M.Sc. Chemistry** Degree (Semester) Examinations, April 2016

Part – III : Core Subject : Second Semester : Paper – III

**PHYSICAL CHEMISTRY – II**

Under CBCS – Credit 4

 Time: **3 Hours**

 Max. Marks: **75**
**SECTION – A**
**Answer ALL Questions :**
**(10 × 2 = 20)**

1. State the Pauli's exclusion principle.
2. What are Term symbols? Give an example.
3. Give the selection rule of IR spectroscopy.
4. Define zero point energy.
5. What is photo electric effect?
6. What is meant by Auger effect?
7. Give the definition of zeta potential.
8. Write a short note on the Langmuir adsorption isotherm.
9. Explain in briefly flash photolysis technique.
10. What is delayed fluorescence?

**SECTION – B**
**Answer ALL Questions :**
**(5 × 5 = 25)**

11. a) State and explain the Slater determinant.

**(OR)**

- b) Write notes on the Born-Oppenheimer approximation.

12. a) Explain in briefly the rigid rotor model.

**(OR)**

- b) Write any five applications of microwave spectroscopy.

13. a) Explain the Frank-Condon principle.

**(OR)**

- b) Give a brief account of Koopman's theorem.

14. a) Illustrate the acid-base catalysis.

**(OR)**

- b) Distinguish between the physisorption and chemisorption.

15. a) Derive the Stern-Volmer equation.

**(OR)**

- b) Explain about photochemical fast reactions.

**SECTION – C**
**Answer any THREE Questions :**
**(3 × 10 = 30)**

16. Discuss the variation method and perturbation theory to helium atom.
17. Describe the vibrations of diatomic and polyatomic molecules.
18. Discuss the classical quantum theories of Raman spectroscopy.
19. Derive the BET adsorption isotherm.
20. Draw and explain detail the various stages of Jablonski diagram.

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**M.Sc. Chemistry** Degree (Semester) Examinations, April 2016

Part – III : Core Subject : Fourth Semester : Paper – I

**ORGANIC CHEMISTRY – IV**

Under CBCS – Credit 4

 Time: **3 Hours**

 Max. Marks: **75**
**SECTION – A**
**Answer ALL Questions :**
**(10 × 2 = 20)**

1. Why N-alkyl substituted amides do not undergo Hoffmann rearrangement?
2. What is Lossen rearrangement? Give its reaction.
3. Give any two medicinal applications of benzofurans.
4. Write any two functions of proteins.
5. What will happen when a steroid is heated with selenium at 360°C?
6. Draw the structure of cortisone.
7. What is self-assembly? Give an example from nature.
8. What are biological catalysis? Give an example.
9. What is the need for electro organic synthesis?
10. Define the term electrode potential.

**SECTION – B**
**Answer ALL Questions :**
**(5 × 5 = 25)**

- 11.a) Write an account of Hunsdiecker reaction.

**(OR)**

- b) What is Sandmeyer reaction? Discuss its mechanism.

- 12.a) Explain the chemistry of nucleic acids.

**(OR)**

- b) Outline the synthesis of thiamine.

- 13.a) Discuss about the biosynthesis of steroids.

**(OR)**

- b) Outline the synthesis of oestrone.

- 14.a) Write briefly about fullerenes.

**(OR)**

- b) Write short notes on molecular recognition.

- 15.a) Discuss briefly the orientation effects in electro organic synthesis.

**(OR)**

- b) Narrate the reactions of intermediates formed in electrode process.

**SECTION – C**
**Answer any THREE Questions :**
**(3 × 10 = 30)**

16. Write the mechanisms for the following : **(3½ + 3 + 3½)**
  - a) Bayer – Villiger rearrangement
  - b) Curtius rearrangement
  - c) Favorski rearrangement
17. Elucidate the structure of vitamin C.
18. a) Write notes on the stereochemistry of steroids.  
 b) How is progesterone synthesised from cholesterol? **(4 + 3 + 3)**  
 c) How is the position of double bond in cholesterol established?
19. a) Write an account of cyclodextrin as a microvessel. **(5 + 5)**  
 b) Give an account of reversible and irreversible inhibitions.
20. a) Write notes on cathodic and anodic conversions. **(7 + 3)**  
 b) Discuss the nature of solvent in electro organic synthesis.

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**M.Sc. Chemistry** Degree (Semester) Examinations, April 2016

Part – III : Core Subject : Fourth Semester : Paper – II

**INORGANIC CHEMISTRY – IV**

Under CBCS – Credit 4

 Time: **3** Hours

 Max. Marks: **75**
**SECTION – A**
**Answer ALL Questions :**
**(10 × 2 = 20)**

- The spectrum of  $[Ru(bpy)_3]Cl_2$  is more intense. Why?
- $Trans - [Cr(NH_3)_4(NCS)Cl]^+ + H_2O \xrightarrow{h\nu} A + B$   
Find the products *A* and *B*.
- Write note on distribution ratio.
- What is Raman effect?
- Find out the possible reaction between  $Na_2S_2O_3$  and  $I_2$ .
- How will you concentrate  $HNO_3$ ?
- Define the term “accuracy”.
- State the number of significant figure in each of the following  
a) 1053800      b) 0.76530
- What are fluorescent chemical sensors?
- Define phosphorescence.

**SECTION – B**
**Answer ALL Questions :**
**(5 × 5 = 25)**

- Discuss about chemical actinometers with examples.

**(OR)**

- Explain the ligand field photochemistry of  $Cr(III)$  complexes.

- Discuss briefly about various types of extraction systems.

**(OR)**

- Write the principle and applications of nephelometry.

- Define the precision and how do measures.

**(OR)**

- Two observers gave the following observations of measurements

Observer 1 :    34.08    34.23    34.02

Observer 2 :    34.32    34.27    34.16

Calculate precision and accuracy of both the observers.

Which observer is more precise and which one is more accurate?

- What are the interhalogen compounds? Give examples.
  - Draw the structure of the following ions showing the position of the lone pairs of electrons.    i)  $[ICl_2]^-$       ii)  $[ICl_4]^-$

**(OR)**

- Write a note on the oxo acids of phosphorous.

- What is fluorescence quenching? How can you use this concept to sense metal ions? Explain.

**(OR)**

- Write the discriminating electron and energy transfer mechanisms in fluorescent chemical sensors.

**SECTION – C**
**Answer any THREE Questions :**
**(3 × 10 = 30)**

- Explain the method of using *tris*–2,2(*bipyridine*) *ruthenium(II)* cation for water splitting to produce hydrogen gas.
- Explain a technique for solvent extraction. **(5 + 5)**
  - Discuss the various factors affecting the solvent extraction.
- Discuss briefly about the oxo-acids series of sulphur.
- Write a brief note on the rejection of measurements. **(7 + 3)**
  - Short note on the Gaussian distribution.
- Explain the principle and methods of anion sensing based on the metal- ligand interaction with examples.

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**M.Sc. Chemistry** Degree (Semester) Examinations, April 2016

Part – III : Core Subject : Fourth Semester : Paper – III

**PHYSICAL CHEMISTRY – IV**

Under CBCS – Credit 4

 Time: **3** Hours

 Max. Marks: **75**
**SECTION – A**
**Answer ALL Questions :**
**(10 × 2 = 20)**

1. Write short note on the charge transfer resistance.
2. What is electro catalysis?
3. Write any two applications of over voltage.
4. State the principle of cyclicvoltametry.
5. Define population inversion.
6. Distinguish between the canonical and micro-canonical.
7. What is photon gas?
8. Write note on the Fermi-Dirac statistics.
9. Explain the Zeigler-Natta catalysis.
10. Mention the definition of conducting polymers.

**SECTION – B**
**Answer ALL Questions :**
**(5 × 5 = 25)**

- 11.a) Illustrate any one double layer models.

**(OR)**

- b) Explain about the fast processes.

- 12.a) Explain the principles of over voltage.

**(OR)**

- b) Write note on a hydrogen-oxygen fuel cell.

- 13.a) Derive the Boltzmann-Planck equation.

**(OR)**

- b) Give a brief account of partition function.

- 14.a) Explain in briefly the heat capacity of diatomic gases.

**(OR)**

- b) Explain the Bose-Einstein statistics.

- 15.a) How is molecular weight determined by using light scattering method?

**(OR)**

- b) Explain the kinetics of mechanism of coordination polymerisation.

**SECTION – C**
**Answer any THREE Questions :**
**(3 × 10 = 30)**

16. Explain
  - i) Butler-Volmer relation and its approximation
  - ii) Tafel relation
17. Discuss the principles, instrumentation and applications of polarography.
18. Derive the Boltzmann distribution law.
19. Discuss the Einstein's and Debye's theories of heat capacity of solids.
20. Discuss the bulk and emulsion process of polymerisation.

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**M.Sc. Chemistry** Degree (Semester) Examinations, April 2016

Part – III : Elective Subject : Second Semester : Paper – I

**MEDICINAL AND PHARMACEUTICAL CHEMISTRY**

Under CBCS – Credit 5

 Time: **3** Hours

 Max. Marks: **75**
**SECTION – A**
**Answer ALL Questions :**
**(10 × 2 = 20)**

1. What is meant by infective diseases? Give an example.
2. Define therapeutic index.
3. How neem and tulsi are used as medicinal plants.
4. How will you classify drugs?
5. Write the structure of streptomycin.
6. What are antioxidants.
7. Differentiate hypnotics and sedatives.
8. Give two examples of neoplastic agents.
9. What are antihypertensive agents?
10. How zinc is used as health promoting drugs?

**SECTION – B**
**Answer ALL Questions :**
**(5 × 5 = 25)**

- 11.a) Discuss the absorption of drugs.

**(OR)**

- b) Explain the assay of drugs by immunological and biological methods.

- 12.a) Discuss the metabolism of drugs.

**(OR)**

- b) Write notes on some water borne diseases.

- 13.a) How chloramphenicol used as antibiotics.

**(OR)**

- b) Write a note on intravenous anesthetics.

- 14.a) Briefly discuss on sedatives.

**(OR)**

- b) Discuss HDL, LDL and lipid lowering drugs.

- 15.a) Give an account on organic pharmaceutical bases.

**(OR)**

- b) How aluminum is used as medicine.

**SECTION – C**
**Answer any THREE Questions :**
**(3 × 10 = 30)**

16. Explain the term pharmacology, pharmacokinetics, pharmacodynamics and antimetabolites.
17. Account on the mechanism of drug action in both cellular and intercellular sites.
18. a) What is AIDS? How it can be prevented?  
b) What are anti-inflammatory agents? Give example.
19. a) What is meant by diabetics? How it is caused?  
How it can be controlled?  
b) Write a brief note on antifungal agents.
20. How vitamins can be used as health promoting drugs? Reason out.

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**M.Sc. Chemistry** Degree (Semester) Examinations, April 2016

Part – III : Elective Subject : Fourth Semester : Paper – II

**CHEMISTRY FOR NATIONAL ELIGIBILITY TEST**

Under CBCS – Credit 2


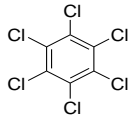
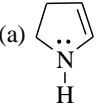
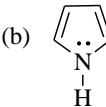
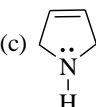
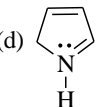
Time: 2 Hours

Max. Marks: 75

**SECTION – A****Answer ALL Questions :****(50 × ½ = 25)**

- The IUPAC nomenclature of  $\text{Na}[\text{PCl}_6]$  is
  - sodiumhexachlorophosphine(V)
  - sodiumhexachlorophosphate(V)
  - sodiumhexachlorophosphine
  - sodiumhexachlorophosphite(V)
- Among the following donors, the one that forms most stable adduct with the Lewis acid  $\text{B}(\text{CH}_3)_3$  is
  - 4-methylpyridine
  - 2,6-dimethylpyridine
  - 4-nitropyridine
  - 2,6-di-*tert*-butylpyridine
- The number of terminal carbonyl groups present in  $\text{Fe}_2(\text{CO})_9$  is
  - 2
  - 5
  - 6
  - 3
- The ratio of relative intensities of the two molecular ion peaks of methyl bromide ( $\text{CH}_3\text{Br}$ ) in the mass spectrum is
  - $M^+ : (M + 2)^+ = 1 : 3$
  - $M^+ : (M + 2)^+ = 3 : 1$
  - $M^+ : (M + 2)^+ = 1 : 1$
  - $M^+ : (M + 2)^+ = 1 : 2$
- A disaccharide that will not give Benedict's test and will not form osazone is
  - maltose
  - lactose
  - cellobiose
  - sucrose
- The bond that gives the most intense band in the infrared spectrum for its stretching vibration is
  - C – H
  - N – H
  - O – H
  - S – H
- The order of polarity of  $\text{NH}_3$ ,  $\text{NF}_3$  and  $\text{BF}_3$  is
  - $\text{NH}_3 < \text{NF}_3 < \text{BF}_3$
  - $\text{BF}_3 < \text{NF}_3 < \text{NH}_3$
  - $\text{BF}_3 < \text{NH}_3 < \text{NF}_3$
  - $\text{NF}_3 < \text{BF}_3 < \text{NH}_3$

8. For the deposition of Pb by electroplating, the best suited compound among the following is  
 a)  $\text{PbCl}_2$       b)  $\text{PdSO}_4$       c)  $\text{Pd}(\text{Et})_4$       d)  $\text{Pd}(\text{BF}_4)_2$
9. In the vibrational spectrum of  $\text{CO}_2$ , the number of fundamental vibrational mode common in both infrared and Raman are  
 a) 3      b) 2      c) 1      d) 0
10. The light pink color of  $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$  and the deep blue color of  $[\text{CoCl}_4]^{2-}$   
 a) MLCT transition in the first and d-d transition in the second  
 b) LMCT transition in both      c) d-d transition in both  
 d) d-d transition in the first and MLCT transition in the second
11. Ethanol and dimethyl ether are best considered  
 a) position isomerism      b) metamerism  
 c) functional isomerism      d) tautomerism
12. Which of the following compounds exhibit geometrical isomerism?  
 a) 1-pentene      b) 2-pentene  
 c) 2-methyl-2-pentene      d) 2-methyl-2-butene
13. What is the possible number of optical isomers for a compound containing n dissimilar asymmetric carbon atoms?  
 a)  $2^n$       b)  $n^2$       c)  $n^{+1}$       d)  $n^{+2}$
14. The electromagnetic radiation used in NMR spectroscopy is  
 a) UV      b) Radiofrequency      c) infra red      d) X ray
15. The type of transition involved in ESR spectroscopy  
 a) nuclear transition      b) proton transition  
 c) neutron transition      d) electronic transition
16. De Broglie equation is  
 a)  $h/v$       b)  $h/m$       c)  $h/p$       d)  $h/k$
17. Arrange the elements Na, Rb, K, Mg in increasing order of atomic radius  
 a) Na, K, Mg, Rb      b) K, Na, Mg, Rb  
 c) Mg, Na, K, Rb      d) Rb, K, Mg, Na
18. Which of the following has highest ionization energy?  
 a) As      b) F      c) Ne      d) He
19. Which of the following statement about repulsion between bond pairs and lone pairs is correct?

- a)  $\text{lp-lp} > \text{lp-bp} > \text{bp-bp}$       b)  $\text{lp-bp} > \text{lp-lp} > \text{bp-bp}$   
 c)  $\text{bp-bp} > \text{lp-bp} > \text{lp-lp}$   
 d) any of three depending upon the type of molecule
20. The pair of species with similar shape is  
 a)  $\text{PCl}_3$ ,  $\text{NCl}_3$       b)  $\text{CF}_4$ ,  $\text{SF}_4$       c)  $\text{PbCl}_2$ ,  $\text{CO}_2$       d)  $\text{PF}_5$ ,  $\text{IF}_5$
21. Newspaper contains a toxic material called  
 a) cadmium      b) lead      c) manganese      d) mercury
22. Which one of these is not known  
 a)  $\text{CuCl}_2$       b)  $\text{CuI}_2$       c)  $\text{CuF}_2$       d)  $\text{CuBr}_2$   
 [Cupric iodide ( $\text{CuI}_2$ ) is not known and rapidly decomposes to cuprous iodide,  $\text{Cu}_2\text{I}_2$  &  $\text{I}_2$ ]
23. Which one of the following types of drugs reduces fever  
 a) Analgesic      b) Antipyretic      c) Antibiotic      d) Tranquilizer
24. Aspirin is known as  
 a) phenyl salicylate      b) acetyl salicylate  
 c) methyl salicylic acid      d) acetyl salicylic acid
25. Which of the following amino acids is basic in nature  
 a) Glutamine      b) Arginine      c) Serine      d) None of these
26. Which of the following is not an  $\alpha$ -amino acid  
 a) Cysteine      b) Proline      c) Trypsin      d) Serine
27. Polymer used in bullet proof glass is  
 a) PMMA      b) Lexan      c) Nomex      d) Kevlar
28. Schiff's base is formed by the reaction of aldehyde with  
 a) amine      b) alcohol      c) phenol      d) carboxylic acid
29. The chemical reaction  +  $3\text{Cl}_2 \xrightarrow[500\text{ K}]{\text{UV light}}$    
 a) substitution reaction      b) an addition reaction  
 c) an elimination reaction      d) rearrangement reaction
30. Which one of the following is an aromatic compound  
 (a)       (b)       (c)       (d) 
31. Chloride of which of the following will be coloured?  
 a) Ag (I)      b) Hg (II)      c) Co(II)      d) Zn(II)

32. Which of the following has the highest electronegativity?  
 a) Na                      b) Mg                      c) K                      d) Ca
33. Which of the following elements will form the least stable superoxide?  
 a) Na                      b) K                      c) Rb                      d) Cs
34. Which of the following statements regarding diborane is *NOT* correct?  
 a) It is an electron deficient molecule  
 b) There is free rotation about B-B bond  
 c) The bonding of two hydrogens is of one type whereas the bonding of the other four is of different type  
 d) Its final hydrolysis products are hydrogen and boric acid
35. The composition of cuprite is  
 a)  $\text{Cu}_2\text{S}$                       b)  $\text{CuFeS}_2$                       c)  $\text{Cu}(\text{OH})_2 \cdot \text{CuCO}_3$                       d)  $\text{Cu}_2\text{O}$
36. Hydrogen bomb is based on the principle of  
 a) Nuclear fusion                      b) artificial radioactivity  
 c) natural radioactivity                      d) nuclear fission
37. Which of the following is a fission reaction?  
 a)  $^{16}_8\text{O} + ^2_1\text{H} \rightarrow ^{14}_7\text{N} + ^4_2\text{He}$                       b)  $^{25}_{12}\text{Mg} + \nu \rightarrow ^{24}_{11}\text{Na} + ^1_1\text{H}$   
 c)  $^{75}_{33}\text{As} + ^4_2\text{He} \rightarrow ^{78}_{35}\text{Br} + ^1_0\text{n}$                       d)  $^{235}_{92}\text{U} + ^1_0\text{n} \rightarrow ^{140}_{56}\text{Ba} + ^{94}_{36}\text{Kr} + 2^1_0\text{n}$
38. In an electrolytic cell, which of the following is not true?  
 a) Cathode is negative terminal                      b) Cathode is positive terminal  
 c) Reduction occurs at cathode                      d) Oxidation occurs at anode
39. The cell emf depends on  
 a) temperature                      b) the size of anode  
 c) the size of cathode                      d) volume of the electrolytic Solution
40. A reaction involving two different reactant can never be a  
 a) second order reaction                      b) bimolecular reactions  
 c) unimolecular reaction                      d) first order reaction
41. Which of the following exhibit the lowest bonding energy?  
 a) HF                      b) HCl                      c) HBr                      d) HI
42. Which of the following formulae represents hydrophosphoric acid?  
 a)  $\text{H}_3\text{PO}_3$                       b)  $\text{H}_4\text{P}_2\text{O}_6$                       c)  $\text{H}_3\text{PO}_4$                       d)  $\text{H}_4\text{P}_2\text{O}_7$
43. Which of the following expression is true?  
 a)  $I = Qt$                       b)  $I = Q/t$                       c)  $I = 1/Qt$                       d)  $I = t/Q$

44. The compound that is not a Lewis acid is  
 a)  $\text{BF}_3$                       b)  $\text{AlCl}_3$                       c)  $\text{BeCl}_2$                       d)  $\text{SnCl}_4$
45. The equilibrium constant of a reaction depends on the  
 a) temperature of the system                      b) catalyst  
 c) amount of species involved                      d) volume of the system
46. Which of the following molecules is paramagnetic?  
 a)  $\text{C}_2$                       b)  $\text{N}_2$                       c)  $\text{O}_2$                       d)  $\text{F}_2$
47. The only stable tetrahalide of lead is  
 a)  $\text{PbF}_4$                       b)  $\text{PbCl}_4$                       c)  $\text{PbBr}_4$                       d)  $\text{PbI}_4$
48. Silicones contain  
 a) C, O and Si                      b) C and Si                      c) O and Si                      d) C, N, O and Si
49. Which of the following ions has the higher reduction potential?  
 a)  $\text{Li}^+$                       b)  $\text{Na}^+$                       c)  $\text{K}^+$                       d)  $\text{Rb}^+$
50. The point group of 1,2-dichlorobenzene is  
 a)  $\text{D}_{2h}$                       b)  $\text{D}_{\text{oh}}$                       c)  $\text{C}_s$                       d)  $\text{C}_{2v}$

### **SECTION – B**

**Answer ALL Questions :** **(10 × 5 = 50)**

51. a) Identify the chiral complexes from the following.

- i)  $[\text{Cr}(\text{EDTA})]^-$                       ii)  $[\text{Ru}(\text{bipy})_3]^{3+}$                       iii)  $[\text{PtCl}(\text{diene})]^+$

**(OR)**

b) The ground states of high-spin octahedral and tetrahedral  $\text{Co}(\text{II})$  complexes are, respectively                      i)  $^4\text{T}_{2g}$  and  $^4\text{A}_2$

- ii)  $^4\text{T}_{1g}$  and  $^4\text{A}_2$                       iii)  $^3\text{T}_{1g}$  and  $^4\text{A}_2$                       iv)  $^4\text{T}_{1g}$  and  $^3\text{T}_1$

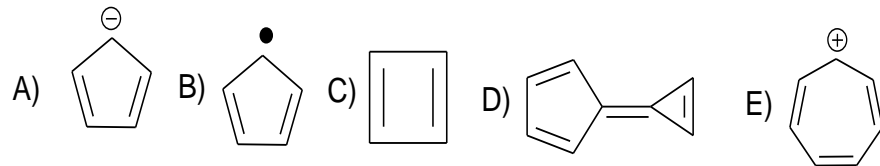
52. a) The number of lone-pairs are identical in the pairs and draw structure the same                      i)  $\text{XeF}_4$ ,  $\text{ClF}_3$                       ii)  $\text{XeO}_4$ ,  $\text{ICl}_4^-$

- iii)  $\text{XeO}_2\text{F}_2$ ,  $\text{ICl}_4^-$                       iv)  $\text{XeO}_4$ ,  $\text{ClF}_3$

**(OR)**

b) The number of metal-metal bonds in  $\text{Ir}_4(\text{CO})_{12}$  is \_\_\_\_\_.

53. a) State Huckel's rule. Classify the following compounds as aromatic or non-aromatic or anti-aromatic on the basis of Huckel's rule.

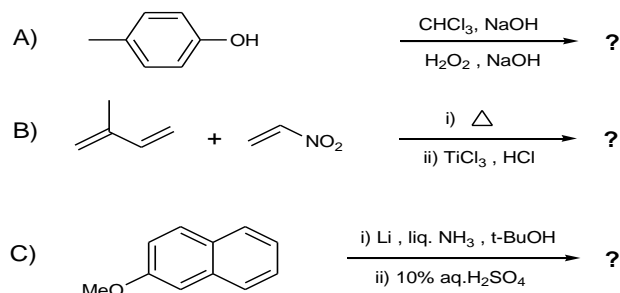


(OR)

b) Explain the following observations.

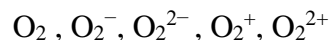
- Tertiary carbon free radical is more stable than secondary carbon free radical.
- Phenyl anion is more stable than cyclohexyl anion.
- Tertiary carbon cation is more stable than secondary and primary carbocation.

54. a) Predict the product in the following reactions.



(OR)

b) Calculate the bond order of following molecules and arrange them in the increasing order of bond strength and bond length.



55. a) Write a note on asymmetric synthesis.

(OR)

b) Discuss the conformation analysis of cyclohexane.

56. a) Discuss the MO diagram of  $O_2$  and  $N_2$  molecules.

Calculate bond orders.

(OR)

b) Explain the shapes of  $CH_4$ ,  $NH_3$  and  $H_2O$  using VSEPR Theory.

57. a) Discuss the different types of thermodynamic processes.

(OR)

b) Discuss the electronic displacements in organic molecules.

58. a) Illustrate the biological significance of Mg and Ca.

(OR)

b) Define buffer solution. Explain the various types of buffer solutions.

59. a) Explain the VBT of  $[CoF_6]^{3-}$  and  $[Cu(NH_3)_4]^{2+}$  Complexes.

Illustrate the hybridization shape, magnetic properties of above complexes.

(OR)

b) Identify the specific role of the following in one or two words in biological processes

i) Ferredoxins	ii) Cytochromes
iii) Haemoglobin	iv) Ferritin
v) Transferrin	

60. a) Explain the chemical evidences for the position of angular methyl groups in cholesterol?

(OR)

b) How is the position of  $-OH$  group in cholesterol established?

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