## VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST <br> (Autonomous \& Residential) <br> [Affiliated to Madurai Kamaraj University]

M.Sc. Chemistry Degree (Semester) Examinations, April 2020

Part - III : Core Subject : Second Semester: Paper - I
ORGANIC CHEMISTRY-II
Under CBCS - Credit 4
Time: $\mathbf{3}$ Hours

## SECTION - A

## Answer ALL Questions :

$(5 \times 1=5)$

1. 2-Chloro-2methylpentane on reaction with sodium methoxide in methanol yields

b)


d) All of the these
2. The repulsion between the bonding electrons of one substituent and the bonding electrons of a nearby substituent is known an $\qquad$
a) Angle strain
b) Steric strain
c) Gauche strain
d) Torsional strain
3. Which one of the following undergoes aldol condensation?
a) HCHO
b) $\mathrm{C}_{6} \mathrm{H}_{5} \mathrm{CHO}$
c) $\mathrm{Cl}_{3} \mathrm{CCHO}$
d) $\mathrm{CH}_{3} \mathrm{COCH}_{3}$
4. In which condition indole is formed ?
a) acidic
b) basic
c) neutral
d) both a\&b
5. Lithium diisopropyl amide is also called as
a) Harpoon base
b) Non-Nucleophilic base
c) Nucleophilic base
d) Both a \& b

## SECTION - B

## Answer any FIVE Ouestions :

$(5 \times 2=10)$
6. State Saytzeff rule.
7. Write the Eliel-Ro equation.
8. What is called hydroxylation?
9. Name the reagent used in Clemmenson reduction.
10. What is called Gilman's reagent?
11. What is E1cB reaction?
12. Give any two application of DDQ .

## SECTION - C

## Answer ALL Questions :

$(5 \times 6=30)$
13.a) Distinguish between elimination and substitution reactions.
[OR]
b) What is meant by neighbouring group participation? Explain.
14.a) State and explain the Curtin-Hammett principle.
[OR]
b) Discuss the conformation and reactivity of di substituted cyclohexanes.
15.a) Account on sharpless asymmetric epoxidation.
[OR]
b) Complete the product and explain the mechanism for the following reaction:
$\mathrm{C}_{6} \mathrm{H}_{5}-\mathrm{CHO}+\mathrm{AC}_{2} \mathrm{O} \xrightarrow{\mathrm{CH}_{3} \mathrm{COONa} / \Delta} ?+\mathrm{CH}_{3} \mathrm{COOH}$
16.a) Explain the Chichibabin reaction with mechanism.
[OR]
b) What is called Birch reduction? Explain its mechanism.
17.a) Specify the synthetic importance of $\mathrm{OsO}_{4}$.
[OR]
b) Account on crown Ethers.

## SECTION - D

## Answer any THREE Questions : <br> $(3 \times 10=30)$

18. Describe the following:
i) $S_{N}{ }^{1}$ mechanism
ii) non classical carbocations
iii) $\mathrm{S}_{\mathrm{N}} \mathrm{A}_{\mathrm{r}}$ mechanism
19.Explain the conformational analysis of decalins.
19. Suggest the mechanism for the Benzoin condensation and

Knoevenagel reaction
21.Using an example, explain the mechanism for the following reactions:
i) Bayer-Villiger reaction
ii) Stobbe condensation
22. Illustrate the following reagents used in functional group
interconversion:
i) LDA
ii) $\mathrm{SeO}_{2}$
(5+5)

## VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST <br> (Autonomous \& Residential) <br> [Affiliated to Madurai Kamaraj University]

M.Sc. Chemistry Degree (Semester) Examinations, April 2020

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

## INORGANIC CHEMISTRY - II

Under CBCS - Credit 4
ime: 3 Hours Max. Marks: 75

## SECTION - A

## Answer ALL Questions :

1. Identify the chiral complexes from the following:
(A) $[\mathrm{Cr} \text { EDTA }]^{-}$;
(B) $\left.[\mathrm{Ru} \text { (bipy) })_{3}\right]^{3+}$;
(C) $[\mathrm{PtCl} \text { (diene) }]^{4-}$
a) A only
b) A and B only
c) A and C only
d) B and C only
2. The value of the 'spin only' magnetic moment for one of the following configurations is 2.84 BM . The correct one is
a) $\mathrm{d}^{4}$ (in strong ligand filed)
b) $d^{4}$ (in weak ligand field)
c) $\mathrm{d}^{3}$ (in weak as well as in strong fields
d) $\mathrm{d}^{5}$ (in strong ligand field)
3. The orange colour of $\mathrm{Cr}_{2} \mathrm{O}_{7}{ }^{2-}$ is due to
a) metal to ligand charge transfer transition
b) ligand to metal charge transfer transition
c) crystal field transition
d) charge transfer complex formation
4. The ability of a group to direct the entering ligand to occupy trans position with respect to the group is called
a) steric effect
b) peroxide effect
c) inductive effect
d) trans effect
5. The colour of $\mathrm{Sm}^{3+}$ is yellow. The expected colour of $\mathrm{Dy}^{3+}$ is
a) Colourless
b) Red
c) Yellow
d) Blue

## SECTION - B

## Answer any FIVE Ouestions :

$(5 \times 2=10)$
6. What is chelate effect? Give example
7. Illustrate inert and labile complexes with an example each.
8. Calculate the CFSE for $\left[\mathrm{Ti}\left(\mathrm{H}_{2} \mathrm{O}\right)_{6}\right]^{3+}$ in weak and strong field states.
9. Tetrahedral complexes are mostly high spin complexes. why?
10. Determine the ground state terms for the following ions.
a) $\mathrm{Cr}^{3+}$
b) $\mathrm{Cu}^{2+}$
11.Define inert and labile complexes.
12. Explain the Consequences of lanthanide contraction.

## SECTION - C

## Answer ALL Questions :

13.a). Discuss the geometrical isomerism with suitable examples.

## [OR]

b). Describe the postulates of Werner's theory with suitable examples. 14.a). Discuss CFT of octahedral complex.

## [OR]

b). Identify the factors affecting the magnitude of $\Delta$
15.a). Assign the possible electronic transition and calculate 10 Dq for $\left[\mathrm{Fe}\left(\mathrm{H}_{2} \mathrm{O}\right) 6\right]^{2+}$.
[OR]
b). Develop the selection rules for electron transitions and explain the mechanism
16.a). Discuss $\pi$-bonding theory of trans effect.

## [OR]

b). Explain $\mathrm{S}_{\mathrm{N}} 1 \mathrm{CB}$ mechanism for ligand substitution reaction.
17.a). How are lanthanides separated from monazithsand.

## [OR]

b). Explain the magnetic properties and oxidation states of lanthanides.

## SECTION - D

## Answer any THREE Questions :

18. Discuss the stability of stability constant by Job's method.
19.a). Construct MO diagram for $\left[\mathrm{CoF}_{6}\right]^{3-}$ and explain .
b). Analyse VBT of $\left[\mathrm{Ni}(\mathrm{CO})_{4}\right],\left[\mathrm{NiCl}_{4}\right]^{2-}$
20.Illustrate factors affecting width and shape of $\mathrm{d}-\mathrm{d}$ spectra.
21.Illustrate the mechanism of inner sphere and outer sphere electron transfer reaction.
22.Explain in detail about the extraction of Uranium from its cheap ore.

## Y Y Y Y Y

# VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST <br> (Autonomous \& Residential) <br> [Affiliated to Madurai Kamaraj University] 

M.Sc. Chemistry Degree (Semester) Examinations, April 2020

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

## PHYSICAL CHEMISTRY-II

Under CBCS - Credit 4
ime: 3 Hours

## SECTION - A

## Answer ALL Questions :

$(5 \times 1=5)$

1. The number of microstates that are possible, when two particles are distributed in four states such that resulting wave functions are antisymmetric with respect to exchange of the particle is
a) 16
b) 12
c) 8
d) 6
2. The symmetric rotor among the following is
a) $\mathrm{CH}_{4}$
b) $\mathrm{CH}_{3} \mathrm{Cl}$
c) $\mathrm{CH}_{2} \mathrm{Cl}_{2}$
d) $\mathrm{CCl}_{4}$
3. The kinetic energy of the photoelectron energies is dependent on
$\qquad$ of the atom, which makes XPS useful to identify the
oxide state.
a) Mass
b) Charge
c) Chemical environment
d) Volume
4. Which of the following statements about a plot of $\mathrm{V}_{0}$ vs. [S] for an enzyme that follows Michaelis- Menten kinetics is false?
a) Km is the $[\mathrm{S}]$ at which $\mathrm{V}_{0}=1 / 2$ Vmax.
b) The shape of the curve is a hyperbola.
c) As $[\mathrm{S}]$ increases, the initial velocity of reaction, $\mathrm{V}_{0}$, also increases.
d) At very high [S], the velocity curve becomes a horizontal line that intersects the y -axis at Km .
5. Which of the following decay with change in multiplicity is known as ISC?
a) $S_{1} \rightarrow S_{0}$
b) $\mathrm{S}_{2} \rightarrow \mathrm{~S}_{1}$
c) $\mathrm{T}_{2} \rightarrow \mathrm{~T}_{1}$
d) $\mathrm{S}_{1} \rightarrow \mathrm{~T}_{1}$

## SECTION - B

## Answer any FIVE Questions : <br> $(5 \times 2=10)$

6. Why do we need approximation method?
7. What is stark effect?
8. Homonuclear diatomic molecules do not show IR spectra. Why?
9. State the conditions for a vibration to be Raman active.
10. What is acidity function.
11. What do you mean by term symbols? Give any one example.
12. Summarize the principle of flash photolysis.

## SECTION - C

## Answer ALL Questions :

$(5 \times 6=30)$
13.a) List out the slater rules to calculate the effective nuclear charge $Z$.
[OR]
b) Give an account of the Hartree - Fock self consistant field method.
14.a) Describe classification of molecules in microwave spectrum.

## [OR]

b) Write notes on the normal vibrations of $\mathrm{CO}_{2}$ and $\mathrm{H}_{2} \mathrm{O}$ molecules.
15.a) What is Raman scattering? Describe classical theory of Raman scattering..

## [OR]

b) Discuss the applications of photoacoustic spectroscopy.
16.a) Write the difference between physisorprion and chemisorption.

## [OR]

b) Write a note on CMC.
17.a) Explain Jablonski diagram.

## [OR]

b) Make use of Kasha's rule to identify n to pi and n to pi * transitions.

## SECTION - D

Answer any THREE Questions :
18. Explain the theory and its applications of varication method to helium atom.
19. Describe the rotational spectrum of a rigid diatomic molecule.
20. Write notes on the following;
i) Photoelectric effect
ii) Koopman's theorem.
21. Discuss Langmuir theory of adsorption and derive expression for Langmuir monolayer adsorption isotherm.
22. Constrcut stern -volmer equation and the process of quenching.

## YYYYY

## SECTION - A

## Answer ALL Questions :

$$
(5 \times 1=5)
$$

1. In Sandmeyer reaction, what is the intermediate compound formed before adding cuprous halide?
a) Alcohol halide
b) Diazonium halide
c) Aqueous halide
d) None of these
2. Which one of the suitable deprotection compound of cyclic acetal.
a) $\mathrm{AcOH} / \mathrm{H}_{2} \mathrm{O}$
b) $\left[\mathrm{H}_{2}\right], \mathrm{Pd} / \mathrm{C}$
c) TBAF
d) HF
3. Which reaction is not appropriate for the synthesis of the following?

4. The correct decreasing basicity order of diazines is $\qquad$
a) Pyrazine > Pyrimidine > Pyridazine
b) Pyridazine > Pyrazine > Pyrimidine
c) Pyridazine > Pyrimidine > Pyrazine
d) Pyrazine > Pyridazine > Pyrimidine
5. Generally the receptors for steroid hormones reside at
a) Nucleoplasm
b) Nuclear membrane
c) Cytoplasm
d) Plasma membrane

## SECTION - B

## Answer any FIVE Questions : <br> $(5 \times 2=10)$

6. What is meant by Curtius rearrangement?
7. How will you protect the carbonyl group in 1,3-Dioxanes.
8. What is retero synthetic analysis?
9. Write the basicity of diazines.
10. Write the classification of steroids.
11. What is called hormones?
12. Bring out the Sandmeyer reaction.

## SECTION - C

## Answer ALL Questions :

13.a) With suitable example, explain the auto oxidation.

## [OR]

b) Discuss the mechanism of Favorski rearrangement in cyclic systems.
14.a) Illustrate the protection and cleavage of chloromethoxymethyl ether.

## [OR]

b) Write the structure of Benzyl carbamate. Mention its protection and cleavage.
15.a) Explain the terms synthons and synthetic equivalent with suitable examples.

## [OR]

b) Explain one group disconnection of alcohol, olefin and.
16.a) How will you synthesis pyrazole? Mention any two reactions of it.

## [OR]

b) Discuss the chemistry of anthrocyanins.
17.a) How will you obtain Progesterone from Cholestrol?

## [OR]

b) Outline the synthesis of bile acids.

## SECTION - D

## Answer any THREE Questions :

18. Suggest the mechanism for the following conversions:
i) ketoxime to N -substituted amide ii) acid amide to primary amine
19. Account on the following:
i) Trichloroacetate
ii) t - Butyl carrbamate
20.i) Explain the functional group interconversion of azides, halides and esters.
ii) Using suitable example, discuss the Umpolong reaction.
20. Discuss the synthesis and any two reactions of the following: (5+5)
i) imidazole
ii) isothiazole
21. How will you convert cholesterol into testosterone.

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M.Sc. Chemistry Degree (Semester) Examinations, April 2019

Part - III : Core Subject : Fourth Semester : Paper - II
INORGANIC CHEMISTRY - VI
Under CBCS - Credit 4
Time: 3 Hours
Max. Marks: 75

## SECTION - A

## Answer ALL Questions :

$(5 \times 1=5)$

1. Oxymyoglobin $\mathrm{Mb}\left(\mathrm{O}_{2}\right)$ and $\mathrm{Hb}\left(\mathrm{O}_{2}\right)_{4}$ respectively are
a) paramagnetic and paramagnetic
b) diamagnetic and diamagnetic
c) paramagnetic and diamagnetic
d) diamagnetic and paramagnetic
2. Iron-sulphur clusters in biological systems are involved in
a) proton transfer
b) atom transfer
c) group transfer
d) electron

## transfer

3. Which one of the following term represented by n in the bragg's equation
a) order of diffraction
b) angle of diffraction
c) Wavelength of diffraction
d) distance between the plane
4. The energy of the free ion in EPR represented by
a) $W_{F}$
b) W
c) V
d) $W_{L S}$
5. Which of the following option is appropriate for the TGA and DTA?
a) TGA and DTA measures only weight
b) TGA measures only weight while DTA measures other effects
c) TGA and DTA measures only temperature
d) TGA measures only temperature while DTA measures other effects

## SECTION - B

## Answer any FIVE Questions : <br> $(5 \times 2=10)$

6. State Bohr effect.
7. Outline the function of carbonic anhydrase.
8. Differentiate hemerythrin and hemocyanin.
9. Distinguish between conductor and insulator on the basis of band theory.
10.Define Edge dislocation.
11.Give the examples for NMR active nuclei
10. Explain the principle of TGA.

## SECTION - C

## Answer ALL Ouestions : <br> $(5 \times 6=30)$

13.a). Choose the functions and deficiency symptoms of Zinc and iron.
[OR]
b). Identify the poisoning effect of CO and cyanide on hemoglobin. 14.a). What are cyto chromes? Give the functions of cytochrome P-450.
[OR]
b). Discuss the structure and functions of Vitamin $\mathrm{B}_{12}$.
15.a). Derive Bragg's equation.
[OR]
b). Compare schottky defect and frenkel defect.
16.a). Discuss the applications of Mossbauer spectroscopy for metal carbonyls.
[OR]
b). Discuss the hyperfine structure in ESR spectra.
17.a). List out the difference between TGA \& DTA.
[OR]
b). Discuss the principle and applications of DTA.

## SECTION - D

## Answer any THREE Questions :

18. Compare the structure and physiological functions of hemoglobin.
19. Construc and explain photosystem I and II in photosynthesis
20. Write a note on
i) Electron diffraction
ii) Neutron diffraction
21.Discuss any four applications of NMR in the structural elucidation of compounds.
21. Discuss the principle and applications of cyclic voltammetry.

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M.Sc. Chemistry Degree (Semester) Examinations, April 2020

Part - III : Core Subject : Fourth Semester : Paper - IV
PHYSICAL CHEMISTRY-IV
Under CBCS - Credit 4
Time: 3 Hours

## SECTION - A

## Answer ALL Questions :

$(5 \times 1=5)$

1. Electrolysis of aqueous solution of 1.0 M NaOH results in
a) Na at the cathode and $\mathrm{O}_{2}$ at the anode
b) $\mathrm{H}_{2}$ at the cathode and $\mathrm{O}_{2}$ at the anode
c) $\mathrm{Na}, \mathrm{H}_{2}$ at the cathode and $\mathrm{O}_{2}$ at the anode
d) $\mathrm{O}_{2}$ at the cathode and $\mathrm{H}_{2}$ at the anode
2. Silver-silver chloride reference electrode is made up of
a) copper wire coated with copper chloride
b) Sodium wire coated with sod. Chloride
c) Mercury with calomel
d) Silver wire coated with silver chloride
3. A collection of large number of systems which are identical with the system under consideration of total volume, total number of molecules is called
a) Ensembles
b) micro canonical ensenmbles
c) phase-space
d) cell
4. Consider a system of 3 fermions which can occupy any of the 4 available energy states with equal probability. The entropy of the system is
a) $\mathrm{k}_{\mathrm{B}} \ln 2$
b) $2 \mathrm{k}_{\mathrm{B}} \ln 2$
c) $2 \mathrm{k}_{\mathrm{B}} \ln 4$
d) $3 \mathrm{k}_{\mathrm{B}} \ln 4$
5. When each chiral centre has the same configuration, the polymer is called
a) Atactic
b) Syndiotactic
c) Isotactic
d) Multitactic

## SECTION - B

## Answer any FIVE Questions :

6. Explain the Tafel relation briefly.
7. Compare polarisable and non-polarisable interfaces.
8. Classify the reactions involving quasi reversible mechanism.
9. Extend the synonyms of voltammogram and polarogram.

10 . What is meant by partition function?
11. What do you mean bu population inversion?
12. Define the term degree of polymerization.

## SECTION - C

## Answer ALL Questions : <br> $(5 \times 6=30)$

13.a) Apply Helmholtz Models to analyse the qualitative and quantitative measurements of electrode process.

## [OR]

b) Build the concept of electrocatalisis.
14.a) Identify the principle and instrumentation of polarography.
[OR]
b) Develop theory and applications of Hydrogen - oxygen fuel cell.
15.a) How will you select equilibrium constant relating with
thermodynamic properties for improving statistical thermodynamics?

## [OR]

b) Solve the derivation of Boltzmann-Planck equation.
16.a) Utilize the derivation of Bose-Einstein statics to detect bosans.

## [OR]

b) Organize a quantum statistics approach of heat capacity of hydrogen molecules.
17. a) What are addition and condensation polymers? Give examples of each.

## [OR]

b) Make the mechanism and importance of Zeigler-Natta catalysis.

## SECTION - D

## Answer any THREE Questions :

18. Categorize the usage of Butler-Volmer relation and its approximation to the kinetics of electrode process.
19. Analyse principle involving cyclic voltammogram of one electron reversible process happened in potassium ferrocyanide/potassium ferricyanide.
20.Divide the types of ensembles with examples.
21.Infere Einsten's and Debye's theories of heat capacities of solids.
20. Discuss the determination of molecular weight by light scattering methods.
M.Sc. Chemistry Degree (Semester) Examinations, April 2019 Part - III : Elective Subject : Fourth Semester: Paper - I

MEDICINAL AND PHARMACEUTICAL CHEMISTRY Under CBCS - Credit 5
Time: 3 Hours Max. Marks: 75

## SECTION - A

## Answer ALL Questions :

1. Swine Flu is caused by
a) HIV
b) HINI
c) Herpes zostr
d) Mumps virus
2. Local anaesthetic drug acting on Peripheral Nervous System is
a) Procaine
b) Amphetamine
c) Peyote
d) Oxycodone
3. Methadone is used as a/an
a) cardiovascular drug
b) antipyretic
c) analgesic
d) anticancer agent
4. Which among the following statements is false about the action of antiarrhythmic drugs:
a) it slows diastolic depolarization
b) it elevates the threshold potential
c) it speeds up potassium efflux
d) it improves metabolic efficiency
5. $\mathrm{TheFe}^{3+}$ ion binding capacity of transferrin is
a) $100 \mathrm{mg} / 100 \mathrm{~mL}$
b) $220 \mathrm{mg} / 100 \mathrm{~mL}$
c) $300 \mathrm{mg} / 100 \mathrm{~mL}$
d) $500 \mathrm{mg} / 100 \mathrm{~mL}$

## SECTION - B

## Answer any FIVE Ouestions : <br> $(5 \times 2=10)$

6. Define therapeutic index.
7. Write any three active sources of drugs.
8. Distinguish between Analgesics and Anesthetics.
9. Explain Anti inflammatory drug with examples.
10. Define the Role and Application of Fe .
11. Give an account on the uses of Penicillin G.
12. Classify Antineoplastic agents

## SECTION - C

## Answer ALL Questions :

13.a) Discuss the assay of Drugs.
[OR]
b) Write about:
i) Pharmacodynamics
ii) Pharmacokinetics
14.a) Write any three biological classification of drugs.
[OR]
b) Identify and List out the Various Sources of Drugs
15.a) What do you mean by anaesthetics?Discuss general \& local anaesthetics.
[OR]
b) Mention Analgesics,
16.a) Write any five active principles in plants.
[OR]
b) Explain Antiviral, Antihyper tensive agents.
17.a) Write note on antibiotics.
[OR]
b) Write note on Antioxidants.

## SECTION - D

## Answer any THREE Questions : <br> $(3 \times 10=30)$

18. How to drug act at extra cellular sites?
19.To List out the Medicinal Importance of Neem \& Tulsi
20.Expalin the Symptoms, Prevention, and treatment of AIDS.
21.Illurtrate the various sources of drugs for Insulin deficiency.
19. Draw the Structure and Medicinal Importance for:
i) Vitamine C
ii) Vitamine D

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## VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST

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M.Sc. Chemistry Degree (Semester) Examinations, April 2020

Part - III : Elective Subject : Fourth Semester : Paper - I
CHEMISTRY FOR NATIONAL ELIGIBILITY TEST
Under CBCS - Credit 5
Time: 2 Hours
Max. Marks: 75

## SECTION - A

## Answer ALL Questions :

$(75 \times 1=75)$

1. The [16- Annulene ] is
a) Aromatic
b) non-aromatic
c) Planar
d) Non resonance but aromatic
2. The following cyclic systems are said to be


a) Anti-aromatic: Aromatic
b) Aromatic: Anti-aromatic
c) Aromatic: Aromatic
3. Among the following cations, which one is highly stable?
a)

b)

c)

d)

4. Primary carbanions are more stable due to lesser.
a)+Ieffect
b)-Ieffect
c) +M effect
d)-M effect
5. Based on Saytzeff's rule, select the most stable alkene.
a) 1-methylcyclohexene
b) 3-methylcyclohexene
c) 4-methylcyclohexene
d) They are all of equal stability
6. Stability order of free radicals increases as we move from primary to tertiary free radicals, due to
a) + I effect
b) - I effect
c) $+M$ effect
d) - M effect
7. Spin value for bent triplet carbene is
a) 0
b) $1 / 2$
c) 1
d) $3 / 2$
8. The bond angle range in triplet carbene is
a) $100-110^{0}$
b) $130-150^{0}$
c) $120-160^{0}$
d) $180-192^{0}$
9. IUPAC name of Oxine is
a) 6-hydroxy quinoline
b) 7-hydroxy quinoline
c) 8-hydroxyl quinoline
d) 9-hydroxy quinoline
10. The IUPAC name of the given compound is

a) (2E, 4E)-3-chlorohexa-2,4-diene-1, 6-diol
b) (2Z, 4E)-3-chlorhexa-2,4-diene-1, 6-diol
c) $(2 \mathrm{Z}, 4 \mathrm{Z})$-4-chlorohexa-2,4-diene-1, 6-diol
d) $(2 \mathrm{E}, 4 \mathrm{Z})$-4-chlorohexa-2,4-diene-1, 6-diol
11.Find out the configuration of the following compound
11. 

is
a) Aromatic
b) Non - aromatic
c) Anti-aromatic
d) Planar alone
13. According to Frost rule, compounds would have incompletely filled orbitals are said to be
a) Aromatic
b) Non - aromatic
c) Anti-aromatic
d) Planar alone
14. In general, the stability of carbanion is directly proportional to
a) $\%$ of $S$ character
b) $\%$ of $p$ character
c) partially $S$ character
d) both a \& b
15. Identify the two enantiomers among the following compounds.

A

B

C

D
a) A and B
b) A and C
c) B and D
d) C and D
16. Identify the reagent in the following reaction.
a) $(1 S 5 R)$
b) (1R 5S)
c) (1S 5S $)$
d) (1R 5R)
a) $\mathrm{NaBH}_{4}$
b) $\mathrm{LiAlH}_{4}$
c) $\mathrm{KMnO}_{4}$
d) PCC
17.Predict the suitable reagent for the following conversion.
a) $\mathrm{OsO}_{4}$
b) $\mathrm{m}-\mathrm{CPBA}$
c) $\mathrm{KMnO}_{4}$
d) Jone's reagent
18. In Wittig reaction, the stabilized ylides gives ..........as the product.
a) $95 \%$ of $Z$ and $5 \%$ of E-alkene
b) $50 \%$ of Z and $50 \%$ of E-alkene
c) Z-Alkene
d) E-Alkene
19. Predict the product in the following reaction.
20.The oxidation state of Rh in Wilkinson catalyst is
a) 0
b) 1
c) 2
d) 3
21.Identify the following reaction.
a) Vilsmeier reaction
b) Appel reaction
c) Swern oxidation
d) Dakin oxidation
22.Diels-Alder reaction is an example of .........cycloaddition reaction.
a) $[2+2]$
b) $[6+2]$
c) $[4+4]$
d) $[4+2]$
23. The photochemical [2+2] cycloaddition of carbonyl compound with an
alkene gives $\qquad$
a) Oxetene
b) Dimer
c) Oxetyne
d) Oxetane
24. The correct order of IR stretching frequency of the $\mathrm{C}=\mathrm{C}$ in the following olefins is $\qquad$ .
a) I $>$ II $>$ III
b) II $>$ III $>$ I
c) III $>$ II $>$ I
d) III $>$ I $>$ II
25. The majority of the monosaccharides found in the human body are of $\qquad$ -
a) L-type
b) D-type
c) DL-types
d) LD-type
26. In the mass spectrum of the compound given below, during the $\alpha$-cleavage, the order of preferential loss of groups is
a) $\mathrm{Me}>\mathrm{C}_{3} \mathrm{H}_{7}>\mathrm{Et}$
b) $\mathrm{C}_{3} \mathrm{H}_{7}>\mathrm{Et}>\mathrm{Me}$
c) $\mathrm{Et}>\mathrm{Me}>\mathrm{C}_{3} \mathrm{H}_{7}$
d) $\mathrm{Et}>\mathrm{C}_{3} \mathrm{H}_{7}>\mathrm{Me}$
27. The Cope rearrangement is an example of $\qquad$ sigmatropic rearrangement.
a) $[3,3]$
b) $[1,3]$
c) $[1,7]$
d) $[1,5]$
28. Which of the following is NOT a common feature of steroids?
a) Steroids are based on a tetracyclic core structure
b) They have a steroid structure in which all trans ring junctions are nearly flat
c) Most steroids have oxygen functionality at C-3
d) Steroids have three 5-membered rings and one 6-membered ring
29. The primary structure of protein refers to
a) Whether the protein is fibrous or globular
b) The amino acid sequence in the polypeptide chain
c) The orientation of the amino acid side chains in space
d) The presence or absence of an $\alpha$-helix
30.The intermediate involved in Paterno-Buchi reaction is
a) Oxirane
b) Free radical
c) Oxetene
d) Oxetane
31. When $+I$ effect increases, the stability of carbanion
a) Decreases
b) Increases
c) no change
d) partially increases
32. Hybridization of Singlet carbene is
a) $\mathrm{SP}^{2}$
b) $\mathrm{SP}^{3}$
c) SP
d) both a \& c
33. In the following compound, the stereo-chemical descriptor for Ha and Hb is

a) enantiotopic
b) diastereotopic
c) homotopic
d) constitutionally heterotopic
34. What is the stereochemical relationship between the following two molecules?

a) Geometrical isomers
c) Diastereomers
b) Enantiomers

d) Identical
35.A description of the precise 3-dimensional topography of the molecule
a) Absolute configuration
b) Relative configuration
c) Chirality
d) Pseudo chirality
36. The absolute configuration of the two stereogenic (chiral) centres in the following molecule is

a) $5 \mathrm{R}, 6 \mathrm{R}$
b) $5 \mathrm{R}, 6 \mathrm{~S}$
c) 5 S 6 R
d) $5 \mathrm{~S}, 6 \mathrm{~S}$
37. The correct statement about the following molecule is

a) Molecular is chiral and possesses a chiral plane
b) Molecule is chiral and possesses a chiral axis.
c) Molecule is achiral as it possesses a plane of symmetry.
d) Molecule is achiral as it possesses a centre of symmetry.
38. Consider the following statements about cis- and trans-decalins.
A. cis-isomer is more stable than trans-isomer
B. trans-isomer is more stable than cis-isomer
C. trans-isomer undergoes ring-flip D.cis-isomer undergoes ring-flip The correct statements among the above are
a) B and D
b) A and C
c) A and D
d) B and C
39. In the compound give below, the relation between HA,HB; and between $\mathrm{Br} 1, \mathrm{Br} 2$ is:

a) $\mathrm{HA}, \mathrm{HB}$ are enantiotropic; and $\mathrm{Br} 1, \mathrm{Br} 2$ are diastereotopic
b) $\mathrm{HA}, \mathrm{HB}$ are diastereotopic; and $\mathrm{Br} 1, \mathrm{Br} 2$ are enantiotropic
c) $\mathrm{HA}, \mathrm{HB}$ are diastereotopic; and $\mathrm{Br} 1, \mathrm{Br} 2$ are homotopic
d) $\mathrm{HA}, \mathrm{HB}$ are enantiotropic; and $\mathrm{Br} 1, \mathrm{Br} 2$ are homotopic
40. In the compound given below, the hydrogenes marked A and B are

a) homotopic
b) isotopic
c) enantiotopic
d) diastereotopic
41.The most stable conformations of 1, 2-difluoroethane and dl-2, 3-butanediol are
(a)

and

(b)

and

(c)
 and


42. The configuration at the two stereocentres in the compound given below are

a) $1 \mathrm{R}, 4 \mathrm{R}$
b) $1 R, 4 S$
c) $1 \mathrm{~S}, 4 \mathrm{R}$
d) $1 \mathrm{~S}, 4 \mathrm{~S}$
43. Isomers exists due to restricted rotation is called as $\qquad$ .
a) Enantiomers
b) Atropisomers
c) Homoisomers
d) Regioisomers
44. What is the relationship between the two groups in the following molecules?

a) They are equatorial to one another
b) They are axial to one another
c) They are cis to one another
d) They are trans to one another
45. Find out the R/S configuration of compound a \& bat marked chiral center
a)
b)

a) R R
b) R S
c) S S
d) SR
46. The active site of metallobiomolecule LADH is:
a) $\mathrm{Mg}^{2+}$
b) $\mathrm{Cu}^{2+}$
c) $\mathrm{Zn}^{2+}$
d) $\mathrm{Fe}^{2+}$
47. The function of superoxide dismutase is conversion of
a) OH to CHO
b) $\mathrm{N}_{2}$ to $\mathrm{NH}_{3}$
c) $\mathrm{O}^{2-}$ to $\mathrm{O}_{2}$ and $\mathrm{H}_{2} \mathrm{O}$
d) $\mathrm{CO}_{2}$ to $\mathrm{HCO}_{3}$
48. Vitamin $\mathrm{B}_{12}$ is a $\qquad$ type of enzyme
a) Isomerase
b) Nitrogenase
c) Hydrolase
d) Oxido reductase
49. Which among the following is a photoredox non-protein:
a) aconitase
b) chlorophyll
c) transferrin
d)metallothionein
50. The formula for coefficient of variation is
a)SX100/ $\overline{\mathrm{X}}$
b) $\overline{\mathrm{X}} \mathrm{X} 100 / \mathrm{S}$
c) $\overline{\mathrm{X}} \mathrm{X} \mathrm{S} / 100$
d) $100 / \overline{\mathrm{X}} \mathrm{X} \mathrm{S}$
51. The number of significant figure in 0.0405 is
a) Two
b) Three
c) Four
d) Five
52. Theprinciple of gas liquid chromatography is:
a) adsorption
b) absorption
c) partition
d) ion-exchange
53. The reference material for Differential Scanning Calorimetry is:
a) $\mathrm{CaCO}_{3}$
b) $\mathrm{AgNO}_{3}$
c) Silica Gel
d) Alumina
54. Neutrino was discovered by:
a) Rutherford
b) Anderson
c) Yukama
d) Fermi
55. Ionising power is maximum for:
a) $\alpha$
b) $\beta$
c) $\gamma$
d) $\delta$
56. Which among the following is not a magic number:
a) 20
b) 55
c) 82
d) 126
57. The Laporte selection rule of UV-spectroscopy is:
a) $\Delta l= \pm 1 \quad \Delta S=0$
b) $\Delta \mathrm{l}=+1 \quad \Delta \mathrm{~S}=+1$
c) $\Delta \mathrm{l}=-1 \quad \Delta \mathrm{~S}=-1$
d) $\Delta \mathrm{l}= \pm 1 \quad \Delta \mathrm{~S}= \pm 1$
58. The correct order of IR stretching vibrational frequency is:
a) $\left[\mathrm{Ti}(\mathrm{CO})_{6}\right]^{2-}>\left[\mathrm{V}(\mathrm{CO})_{6}\right]^{-}>\mathrm{CO}>\left[\mathrm{Cr}(\mathrm{CO})_{6}\right]$
b) $\left[\mathrm{Cr}(\mathrm{CO})_{6}\right]>\mathrm{CO}>\left[\mathrm{V}(\mathrm{CO})_{6}\right]^{-}>\left[\mathrm{Ti}(\mathrm{CO})_{6}\right]^{2-}$
c) $\mathrm{CO}>\left[\mathrm{V}(\mathrm{CO})_{6}\right]^{-}>\left[\mathrm{Ti}(\mathrm{CO})_{6}\right]^{2-}>\left[\mathrm{Cr}(\mathrm{CO})_{6}\right]$
d) $\mathrm{CO}>\left[\mathrm{Cr}(\mathrm{CO})_{6}\right]>\left[\mathrm{V}(\mathrm{CO})_{6}\right]^{-}>\left[\mathrm{Ti}(\mathrm{CO})_{6}\right]^{2-}$
59. Which among the following NMR nucleus has maximum natural abundance
a) 11 B
b) 14 N
c) 19 F
d) 115 Sn
60. The formula of optical density in Mossbauer spectroscopy is given by:
a) $\log \mathrm{I} / \mathrm{I}_{0}$
b) $\log \mathrm{I}_{0} / \mathrm{I}$
c) $\log \mathrm{I}+\log \mathrm{I}_{0}$
d) $\mathrm{I}_{0}-\mathrm{I}$
61.If specific conductivity of $\mathrm{N} / 50 \mathrm{KCl}$ solution at 298 K is $0.002765 \mathrm{ohm}^{-1} \mathrm{~cm}^{-1}$ and resistance is 100 ohm , then the cell constant is:
a) $0.2765 \mathrm{~cm}^{-1}$
b) $0.00002765 \mathrm{~cm}^{-1}$
c) $0.3765 \mathrm{~cm}^{-1}$
d) $0.00003765 \mathrm{~cm}^{-1}$
62. Given : $\Lambda^{0}{ }_{\mathrm{m}}\left(\mathrm{NH}_{4} \mathrm{Cl}\right)=149.7 \mathrm{Scm}^{2}, \lambda^{0}{ }_{\mathrm{m}}$ of $\mathrm{H}_{2} \mathrm{O}$ and HCl are 198 and 76.3
$\mathrm{Scm}^{2}$ respectively, then $\Lambda_{\mathrm{m}}^{0}\left(\mathrm{NH}_{4} \mathrm{OH}\right)$ is $\qquad$ $\mathrm{Scm}^{2}$ :
a) 134.4
b) 171.4
c) 234.4
d) 271.4
63. The standard emf of the cell $\mathrm{Ni} / \mathrm{Ni}^{2+} / / \mathrm{Cu}^{2+} / \mathrm{Cu}$ is 0.59 V . The electrode potential of Cu is 0.34 V . The electrode potential of Ni must be:
a) -0.93 V
b) +0.93 V
c) -0.25 V
d) +0.25 V
$64 . \mathrm{A}+2 \mathrm{~B} \rightarrow 3 \mathrm{C}+2 \mathrm{D}$, the rate of disappearance of B is $1 \times 10^{-2} \mathrm{~mol} \mathrm{lit}{ }^{-1} \mathrm{sec}^{-1}$, the rate of the reaction is:
a) $0.5 \times 10^{-2} \mathrm{~mol} \mathrm{lit}^{-1} \mathrm{sec}^{-1}$
b) $1 \times 10^{-2} \mathrm{~mol} \mathrm{lit}{ }^{-1} \mathrm{sec}^{-1}$
c) $1.5 \times 10^{-2} \mathrm{~mol} \mathrm{lit}^{-1} \mathrm{sec}^{-1}$
d) $2 \times 10^{-2} \mathrm{~mol} \mathrm{lit}^{-1} \mathrm{sec}^{-1}$
65.If the initial concentration of a zero order reaction is 100 moles and it takes half-an-hour to reduce to 50 moles, the rate constant value is:
a) $0.67 \mathrm{~mol} \mathrm{lit}{ }^{-1} \mathrm{sec}^{-1}$
b) $1.67 \mathrm{~mol} \mathrm{lit}^{-1} \mathrm{sec}^{-1}$
c) $0.67 \mathrm{~mol} \mathrm{lit}^{-1} \mathrm{~min}^{-1}$
d) $1.67 \mathrm{~mol} \mathrm{lit}{ }^{-1} \mathrm{~min}^{-1}$
66. The graph $\mathrm{t}_{1 / 2}$ vs $1 /$ a given below corresponds to which order of the reaction:

a) zero
b) first
c) second
d) third
67. The dispersion phase and dispersion medium of a pumice stone respectively are:
a) solid,liquid
b) liquid, solid
c) gas,solid
d) solid,solid
68. Cheese is an example of colloidal system of
a) solid sol
b) gel
c) emulsion
d) aqua sol
69.Miscelles falls under the category of $\qquad$ colloids:
a) multimolecular
b) macromolecular
c) associated
d) dissociated
70.Freundlich adsorption isotherm is given by the equation:
a) $x / m=K P^{1 / n}$
b) $m / x=K P^{1 / n}$
c) $\mathrm{x} / \mathrm{m}=\mathrm{PK}^{1 / n}$
d) $m / x=\mathrm{PK}^{1 / n}$
71.The structure of zeolites are:
a) parallelo-octahedra
b) trapez-octahedra
c) cuba-octahedra
d) rhombi-octahedra
72. Conversion of proteins into aminoacids by hydrolysis in intestines is done by the enzyme:
a) pepsin
b) trypsin
c) zymase
d) invertase
73. The formula for weight average molecular weight, $\mathrm{M}_{\mathrm{w}}$ is ${ }^{-}$
a) $\sum \mathrm{NiMi}^{2} / \sum \mathrm{NiMi}$
b) $\sum \mathrm{NiMi} / \sum \mathrm{NiMi}$
c) $\sum \mathrm{NiMi}^{2} / \sum \mathrm{Ni}$
d) $\sum \mathrm{NiMi} / \sum \mathrm{Ni}$
74. The $\mathrm{M}_{\mathrm{n}}$ for a system containing 100 molecules where 40 molecules have molecular weight of 100 and the remaining have molecular weight of 50 is:
a) 7
b) 70
c) 700
d) 7000
75. The poly dispersity index=1 only when the sample has:
a) $M_{w}>M_{n}$
b) $M_{w}=M_{n}$
c) $\mathrm{M}_{\mathrm{w}}<\mathrm{M}_{\mathrm{n}}$
d) $\mathrm{M}_{\mathrm{w}} \lll \mathrm{M}_{\mathrm{n}}$

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