VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
(Autonomous & Residential)
[Affiliated to Madurai Kamaraj University]

B.Sc. (Bot. / Zoo.) Degree (Semester) Examinations, November 2019
Part – III : Allied Subject : First Semester : Paper – I

CHEMISTRY FOR BIOLOGIST – I
Under CBCS – Credit 4

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. An organic compound has empirical formula CH_2O and molecular weight is 90. Its molecular formula will be
   a) $C_3H_6O_3$ b) $C_6H_{12}O_6$ c) $C_2H_4O_2$ d) None of these
2. Plane-polarized light is affected by
   a) Identical molecules b) all polymers
   c) chiral molecules d) all biomolecules
3. Which of the following is negative nucleophile?
   a) NH_3 b) H^+ c) $AlCl_3$ d) OH^-
4. Which of the following arrow is used to indicate the resonance structures of molecule?
   a) → b) ↔ c) ⇌ d) ⇒
5. The hybridization of carbon in methane is
   a) sp b) sp^2 c) sp^3 d) dsp^2
6. A carbocation will combine with a _____ to become stable.
   a) Electrophile b) Nucleophile c) Hydrophile d) None of the above
7. A reaction requires the presence of a strip of metal in the reaction vessel, when the reactants are gases. This is an example of what kind of catalysis?
   a) homogeneous b) heterogeneous
   c) equilibrium d) thermodynamic

8. The emission of light as a result of chemical reaction is called

a) bioluminescence b) chemiluminescence

c) fluorescence d) phosphorescence

9. In Standard solution which of the following is accurately known

a) strength of solution b) volume c) pressure d) temperature

10. Properties of a primary standard for use in acid-base titrations include

a) high purity and low solubility

b) low molar mass and low solubility

c) reactive with oxygen and low molar mass

d) stability and high purity

SECTION – B

Answer any FIVE Questions : (5 × 2 = 10)

11. What is the difference between empirical formula and molecular formula?
12. What are called optical isomers? Give examples.
13. What is meant by polymerisation reaction?
14. Define free radical. Give an example.
15. What are catalytic promoters?
16. Compare thermal reactions with photochemical reactions.
17. Define molarity.

SECTION – C

Answer ALL Questions : (5 × 5 = 25)

18. a) Percentage composition of an organic substance as determined by analysis was:

carbon – 14.5 ; hydrogen – 1.8 ; chlorine – 64.46 ; oxygen – 19.24.

Calculate its empirical formula.

(OR)

b) Explain cis – trans isomerism in alkenes.

19. a) Discuss electrophiles and nucleophiles with examples.

(OR)

b) Write the differences between resonance and tautomerism.

20. a) Discuss briefly about the hybridization of carbon in methane.

(OR)

b) Explain the types of fission involving in covalent bond.

21. a) Describe the following i) Acid base catalysis ii) Enzyme catalysis

(OR)

b) Explain the following i) Chemiluminescence ii) Bioluminescence

22. a) Write notes on i) Mole concept

ii) Equivalent weight iii) Weight percentage

(OR)

b) Explain the principle of titrimetry.

SECTION – D

Answer any THREE Questions : (3 × 10 = 30)

23. What is structural isomerism? Discuss its types in detail with examples.
24. Describe the four main classifications of organic reactions.
25. Explain the structure and stability of carbocations with examples.
26. Draw Jablonski diagram and explain the various photophysical processes.
27. Discuss in detail about primary and secondary standard solutions.

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B.Sc. Physics Degree (Semester) Examinations, November 2019
Part – III : Allied Subject : First Semester : Paper – I

CHEMISTRY FOR PHYSICIST – I
Under CBCS – Credit 4

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. When an electron drops from a higher energy level to a lower energy level, then
   a) the energy is observed b) the energy is released
   c) the nuclear charge increases d) the nuclear charge decreases
2. In the ground state of an atom, the electrons tend to occupy the available orbitals in the order of energies
   a) increasing b) decreasing c) any d) none of these
3. The strength of a bond depends upon
   a) Free rotation about σ bond
   b) Extent of overlapping between the orbitals
   c) Resonance in the molecule
   d) Whether the overlap is axial or sidewise
4. The total number of orbitals taking part in sp hybridization in carbon atom is
   a) One b) Three c) Two d) Four
5. Anti-bonding molecular orbitals are produced by
   a) Constructive interaction of atomic orbitals
   b) Destructive interaction of atomic orbitals
   c) The overlap of the atomic orbitals of two negative ions
   d) All of these

6. Which of the following has a high polarising power?

a) Mg^{2+} b) Al^{3+} c) Na^{+} d) Ca^{2+}

7. Alpha particles can be best described as

a) a double-charged hydrogen nucleus

b) an electron

c) a pulse of electro-magnetic radiation

d) a double-charged helium ion

8. Nitrogen^{-12} is most likely to decay by _____

a) gamma emission b) alpha emission

c) beta emission d) Either positron emission or electron capture

9. Which of the following indicator is used for the titration of strong acid vs strong base?

a) Methyl orange b) Phenolphthalein

c) Bromocresol Green d) Bromothymol Blue

10. The characteristics of a primary standard are

a) Extremely pure b) Highly stable

c) Less hygroscopic d) All of the above

SECTION – B

Answer any FIVE Questions : (5 × 2 = 10)

11. Define atomic number and mass number.
12. State Hund's rule.
13. What is hybridization?
14. Mention any two properties of ionic compound.
15. Define mass defect.
16. What is called binding energy?
17. Define : Normality.

SECTION – C

Answer ALL Questions : (5 × 5 = 25)

18. a) Illustrate the Bohr's hydrogen spectrum.

(OR)

b) Describe the shapes of atomic orbital.

19. a) Explain the formation of He_2 molecule.

(OR)

b) Discuss the types of overlapping with an example.

20. a) Draw and explain the MO diagram of H_2 molecule.

(OR)

b) Enumerate the postulates of MO theory.

21. a) Write a note on Soddy's group displacement law.

(OR)

b) How will you distinguish between nuclear fission and nuclear fusion?

22. a) Discuss the principle of titration.

(OR)

b) How will you prepare standard solution?

SECTION – D

Answer any THREE Questions : (3 × 10 = 30)

23. Explain the postulates and limitations of Bohr's theory.
24. Illustrate the formation of N_2 and O_2 molecules.
25. Describe the hydrogen bond and its types.
26. Explain the applications of radioactivity in various fields.
27. Discuss in detail the primary and secondary standard solution.

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VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
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B.Sc. Chemistry Degree (Semester) Examinations, November 2019
Part – III : Core Subject : First Semester : Paper – II

GENERAL CHEMISTRY – I
Under CBCS – Credit 4

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. The series of lines present in the visible region of Hydrogen spectrum is:
   a) Lyman b) Balmer c) Paschenn d) Brackett
2. How is energy and wavelength related to each other:
   a) E= hc/λ b) E=hλ/c c) E=cλ/h d) E=hcλ
3. The order of screening effect of orbital is:
   a) s>p>d>f b) f>d>p>s c) p>d>s>f d) d>f>s>p
4. The predominant factor to determine the nature of bonds is:
   a) charge b) electronegativity c) size d) mass
5. A carbon attached to three other carbon atoms is called as _____
   a) Neo b) Primary c) Secondary d) Tertiary
6. CH_3CH_2OH and CH_3-O-CH_3 are the example of _____
   a) Positional isomerism b) Functional isomerism
   c) Chain isomerism d) Metamerism
7. Which one of the following is an example of +I effect?
   a) –F b) $–CH_3$ c) –SH d) – COOH
8. Which of the following is a Lewis acid?
   a) BF_3 b) CH_3OH c) NH_3 d) CH_3OCH_3
9. The substance adsorbed on the surface is called
   a) adsorbent b) adsorbate
   c) absorbent d) none of the above

10. A catalyst increase the rate of the reaction because it

a) Increase the activation energy

b) decrease the energy barrier for reaction

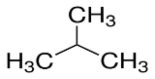
c) decrease the collision diameter

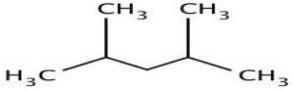
d) increase the temperature coefficient

SECTION – B

Answer any FIVE Questions : **(5 × 2 = 10)**

11. State Hund's rule.
12. What is dipole moment? Give an example.
13. Write the IUPAC name of the following





14. Write an example for each of the following

i) Aromatic ii) Non aromatic

15. What is Resonance effect?
16. Write the different types of adsorption.
17. What is a promoter?

SECTION – C

Answer ALL Questions : **(5 × 5 = 25)**

18. a) Discuss about the shapes of atomic s,p,and d orbital's.

(OR)

b) Derive the Bohr's energy of electron in hydrogen atom.

19. a) Explain the determination of electro negativity using Muliken's scale.

(OR)

b) Discuss about the VBT and its limitations.

20. a) Explain the following terms with suitable example

i) Empirical formula ii) Molecular formula

(OR)

b) Explain the aromaticity rules for benzenoid compound.

21. a) Explain the structure and stability of Nitrene and carbanions.

(OR)

b) Write a short note on following i) Inductive effect ii) Steric effect

22. a) i) Discuss about the auto catalysis with suitable examples.

ii) Explain modern adsorption theory

(OR)

b) Write note on Freundlich adsorption isotherms.

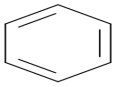
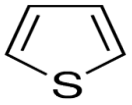
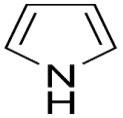
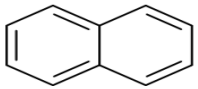
SECTION – D

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

23. Write short note on i) Quantum numbers **(8 + 2)**

ii) Pauli's exculsion principle

24. How will you determine the electro negativity by Pauling's method?
25. Find out aromatic, antiaromatic and nonaromatic of the following compound

a)  b)  c)  d)  e) 

26. Write note on following i) Mesomericeffect **(2½+2½+2½+2½)**

ii) Electromeric effect

iii) Elimination Reaction

iv) Rearrangement

27. i) Write BET equation. **(2 + 5 + 3)**

ii) How will you distinguish between physical and chemical adsorption.

iii) Write note on acid base catalysis.

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B.Sc. Chemistry Degree (Semester) Examinations, November 2019
Part – III : Core Subject : First Semester : Paper – II

GENERAL CHEMISTRY – II
Under CBCS – Credit 4

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. The characteristic properties of an acid are due to the presence of _____
   a) Hydride ions b) Hydroxyl ions
   c) Hydronium ions d) Oxide ions
2. An example for protic solvent is
   a) H_2SO_4 b) Hexane c) CCl_4 d) $CHCl_3$
3. The most abundant isotope of hydrogen is
   a) $_1H^3$ b) $_1H^2$ c) para-hydrogen d) $_1H^1$
4. Which of the following alkali metal gives a crimson red colour to flame?
   a) Sodium b) Potassium c) Rubidium d) Lithium
5. When n-hexane is heated at 500^oC gives lower alkanes and alkenes. This reaction is an example of _____
   a) Isomerization b) Pyrolysis
   c) Catalytic reforming d) Aromatization
6. Which of the following is given off during ripening fruits and vegetables?
   a) Ethane b) Ethene c) Ethyne d) Methane
7. A system that can transfer both energy and matter to and from its surroundings is called
   a) an isolated system b) a closed system
   c) an open system d) a heterogeneous system

8. The amount of heat required to raise the temperature of one mole of the substance by 1 K is called

a) heat capacity b) molar heat capacity

c) molar heat d) molar capacity

9. The sols in which the dispersed phase exhibit a definite affinity for the medium are the solvent is called

a) lyophilic sols b) lyophobic sols c) emulsion d) hydrosols

10. An emlusion is a colloidal solution of a _____ dispersed in a another liquid

a) Solid b) Liquid c) Gas d) Medium

SECTION – B

Answer any FIVE Questions : (5 × 2 = 10)

11. Write the Lewis definition of acids and bases.
12. Why alkali metal impart color to the flame.
13. Write the uses of D_2O.
14. What is Sabatier –Sanderson's reaction?
15. State zeroth law of thermodynamics.
16. What is meant by Tyndall effect?
17. State Hardy-Schulze law.

SECTION – C

Answer ALL Questions : (5 × 5 = 25)

18. a) Write note on i) Lux and Flood concept of acids and bases.
ii) Usanovich concept of acids and bases

(OR)

b) Write advantages and disadvantages of liquid SO_2 using as solvents.

19. a) Describe the chemical properties of 's' block elements.

(OR)

b) Describe the preparation, properties of ortho and para hydrogen.

20. a) Complete the following reactions with explanation. **(2 + 2 + 1)**

i) $CH_2=CH_2$ + Alkaline $KMnO_4 \rightarrow$?

ii) $CH_3CH=CH_2 + H_2O/H^+ \rightarrow$?

iii) $CH_3CH_2Cl + KOH(Alcoholic) \rightarrow$?

(OR)

b) Write the Wurtz and Kolbe's reactions.

21. a) Derive Kirchoff's equation.

(OR)

b) Write note on **(2 + 2 + 1)**

i) open system ii) intensive properties iii) surrounding

22. a) Write short note on i) Brownian movement ii) protective colloids

(OR)

b) Explain the purification of colloidal systems.

SECTION – D

Answer any THREE Questions : (3 × 10 = 30)

23. Explain the chemical reaction that can occur in liquid ammonia.
24. i) Discuss about the diagonal properties of Be and Al. **(5 + 5)**
ii) Write note on hydrides and its classification.
25. Write note on following

i) Corey-House reaction. ii) Markounikov's rule.

iii) Saytzeff's rule iv) ozonolysis v) oxymercuration

26. i) Derive the relationship between $\Delta H = \Delta E + \Delta nRT$. **(5 + 5)**
ii) Derive $c_p - c_v = R$ for one mole of an ideal gas.
27. Define the following terms i) Electrophoresis ii) Electro osmosis

iii) Gold number iv) Zeta potential v) Emulsion

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B.Sc. Chemistry Degree (Semester) Examinations, November 2019
Part – III : Core Subject : Third Semester : Paper – I

ORGANIC CHEMISTRY – I
Under CBCS – Credit 4

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. Vinyl chloride undergoes polymerization in the presence of benzoyl peroxide to form
   a) polyethylene b) polyvinyl chloride c) Teflon d) acetylene
2. When two moles of ethyl chloride react with two moles of sodium in the presence of ether what will be formed?
   a) 2 moles of ethane b) 1 mole of ethane
   c) 2 moles of butane d) 1 mole of butane
3. Nitrobenzene when reduces with Sn + HCl gives
   a) azobenzene b) hydraxzobenzene
   c) aniline d) benzidine
4. Reaction of benzene diazonium halide with acrylonitrile in presence of Cu^{2+} is known as
   a) Gomberg reaction b) Pschorr's synthesis
   c) Meerwein reaction d) Bart reaction
5. Reaction of aliphatic primary amines with nitrous acid to produce nitrogen-free organic products proceeds through
   a) free radical intermediates b) carbocation intermediates
   c) carbanion intermediate d) nitrene

6. Aniline can be prepared by

   a) reduction of nitrobenzene b) nitration of nitrobenzene

   c) oxidation of nitrobenzene d) chlorination of benzene

7. Which of the following compounds will react with ethanolic KCN?

   a) Ethane b) Chlorobenzene c) Benzaldehyde d) Acetone

8. Treatment of phenol with mixture of HCN / HCl in the presence of $AlCl_3$ to give

   a) Cinnamaldehyde b) Benzaldehyde

   c) Benzophenone d) Salicylaldehyde

9. Which of the following groups has the highest priority according to the Cahn-Ingold-Prelog sequence rules?

   a) $-CH_3$ b) $-CH_2CH_3$ c) $-CH=CH$ d) $-C\equiv CH$

10. Which of the following definitions of an asymmeric reaction is the most accurate?

   a) A reaction that creates a new chiral centre in the product

   b) A reaction that involves a chiral reagent

   c) A reaction which creates a new chiral centre with selectivity for one enantiomer/diasatereoisomer over another

   d) A reaction that is carried out on an asymmetric starting material

SECTION – B

Answer any FIVE Questions : (5 × 2 = 10)

11. How is ethyl chloride prepared from phosphorous chloride?
12. What is Wurtz reaction?
13. Give two chemical tests to identify the nitro group.
14. Write down the Ritter reaction.

15. What happens when acetaldehyde reacts with HCN?
16. Write a note on: Wolf-Kishner reduction reaction.
17. What is Walden inversion?

SECTION – C

Answer ALL Questions : (5 × 5 = 25)

18. a) Discuss the mechanism of E_1 and E_2 reactions of alkyl halides.

(OR)

b) How is Vinyl chloride prepared from Vicinal dihalides? Write its two chemical properties.

19. a) Explain the hydrolysis and reduction reactions of Nitromethane.

(OR)

b) Write the nucleophilic and electrophilic substitution reactions of nitro benzene.

20. a) Give the preparations of Methyl amine and Aniline.

(OR)

b) Explain the following:

i) Hinsberg test. ii) Ortho effect of Aromatic amines.

21. a) How would you distinguish between acetaldehyde and benzaldehyde?

(OR)

b) Write notes on Claisen condensation and Reformatsky reaction.

22. a) Distinguish between enantiomers and diastereomers.

(OR)

b) Give R and S notations for the following compounds:

i) Meso- tartaric acid. ii) dl-lactic acid.

SECTION – D

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

23. Describe the preparation and chemical properties of Chlorobenzene and Benzyl chloride.

24. Write notes on: i) Sandmeyer reaction.
ii) Gattermann coupling reaction.
iii) Electrolytic reduction of Nitrobenzene.

25. Explain the following:
i) Mechanism of Schotten Bouman reaction.
ii) Hoffmann elimination of Quaternary ammonium salts.

26. Discuss the chemical reaction of the following compounds and mention their name of the reaction.
i) Conversion of acetaldehyde into β-hydroxyaldehyde.
ii) Conversion of benzaldehyde into α-hydroxy Ketone.

27. Write a brief account of optical activity of biphenyls and allenes.

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B.Sc. Chemistry Degree (Semester) Examinations, November 2019
Part – III : Core Subject : Third Semester : Paper – II

PHYSICAL CHEMISTRY – I
Under CBCS – Credit 3

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. The entropy is measured in

   a) cal K–1 mol–1 b) JK–1 mol–1 c) entropy unit d) all of these

2. Which is the correct unit for entropy?

   a) kJ mol b) JK^{-1} mol c) JK^{-1} mol^{-1} d) kJ mol

3. Which of the following thermodynamics functions have been called "the arrow of time"

   a) Enthalpy b) Gibb's free energy

   c) Entropy d) Helmholtz free energy

4. According To Nernst Heat Theory At $T=0^{o}K$

   a) $\left[\partial(\Delta G)/\partial T\right]_P = 0$ b) $\Delta G = \Delta E$

   c) $\Delta G = \Delta H$ d) All Are Correct

5. Which of the following is not an example of a weak acid?

   a) Lactic acid b) Carbonic acid c) Sulfuric acid d) Pyruvic acid

6. A solution of ammonium acetate is _____ and its pH value is

   a) acidic, less than 7 b) basic, more than 7

   c) neutral, less than 7 d) neutral, more than 7

7. The molar viscosity is the
   a) Product of molar surface and viscosity
   b) Sum of molar surface and viscosity
   c) Difference of molar surface and viscosity
   d) Product of molar volume and density
8. To evaluvate the dipolemoment of benzene derivatives, we need
   a) Bond moments b) Atom moments
   c) Group moments d) Angle moments
9. The K_D values for distribution of phenol between H_2O and $CHCl_3$ are given as C_1/C_2 =0.371, 0.2142. Based on these values phenol is
   a) Existing as a single molecule
   b) Existing as a associated molecule
   c) neither single nor associated molecules
   d) distributed properly
10. The K_D for the most of the organic compounds is usually _____
   a) Large b) Small c) Very Large d) Negligible

SECTION – B

Answer any FIVE Questions : (5 × 2 = 10)

11. Mention any two limitations of first law of thermodynamics.
12. What is known as cyclic process?
13. Define chemical potential.
14. State Nernst heat theorem.
15. Define buffer capacity.
16. Define surface tension.
17. State Nernst distribution law.

SECTION – C

Answer ALL Questions : (5 × 5 = 25)

18. a) Write a brief note on efficiency of a heat engine.

(OR)

b) Explain the terms spontaneity and irreversibility on the basis of entropy concept.

19. a) Summarize the physical significance of entropy.

(OR)

b) Explain the determinations of absolute entropy.

20. a) What are buffer solutions? Explain the action of buffer mixture of a weak acid and its salt.

(OR)

b) What is meant by degree of hydrolysis and hydrolysis constant? Explain any one method of determination of degree of hydrolysis.

21. a) Explain para and dimagnetism.

(OR)

b) Write a short note on dipole moment and its determination.

22. a) Explain the conditions for validity of the Nernst distribution law.

(OR)

b) Demonstrate the application of Nernst distribution law in solvent extraction process.

SECTION – D

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

23. i) 5 moles of an ideal gas expand isothermally and reversibly from 3 litres to 30 litres at 25^{o}C. Calculate the entropy change. **(3)**

    ii) Derive an expression for entropy change accompanying isothermal expansion of an ideal gaes. **(7)**

24. Derive Clausius-Clapeyron equation.

25. Illustrate the applications of the concept of the solubility product in predicting precipitation reactions, preferential precipitation of an insoluble and soluble salts. **(4 + 2 + 4)**

26. Discuss on the term viscosity and its applications in chemical constitution.

27. Derive thermodynamically the Nernst distribution law. Explain the applications of it in the study of complexes.

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B.Sc. Chemistry Degree (Semester) Examinations, November 2019
Part – III : Core Subject : Fifth Semester : Paper – I

ORGANIC CHEMISTRY – II
Under CBCS – Credit 4

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

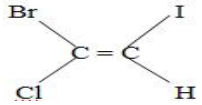
1. How will you distinguish between maleic acid and fumaric acid with the help of simple test
   a) Heating b) oxidation c) reduction d) addition
2. When Phthalic anhydride reacts with ammonia what will be the product
   a) phthalimide b) phthalic acid
   c) terephthalic acid d) none of these
3. What will happen when methyl cyanide reacts with methyl magnesium bromide
   a) Acetone b) Formic acid c) acetic acid d) benzoic acid
4. Which type of amine produces N_2 when treated with HONO?
   a) Primary b) Secondary c) tertiary d) none of these
5. Aniline reacts with nitrous acid at low temperatures to give
   a) N-Nitrosoamine b) Nitrile c) Diazonium salt d) Nitrite salt
6. The conversion of acid chloride into amide followed by hydrolysis gives higher homologue is called _____
   a) Arndt-Eistert Reaction b) Beckamnn reaction
   c) HVZ reaction d) none of these

7. Which of the following statements is FALSE about enantiomers?
   a) Rotate plane polarized light
   b) Superimposable mirror images
   c) Non-superimposable mirror images
   d) Have the same melting point
8. The process of converting *d* form to *l* form or vice-versa is known as
   a) Racemisation b) Resolution
   c) Revolution d) Walden inversion
9. Angle strain is the strain induced in a molecule when the bond angles are different from the ideal tetrahedral bond angle of _____
   a) 108° b) 104° 28’ c) 109° 28’ d) 119° 28’
10. The calorific value when a substance undergoes complete combustion with oxygen under standard conditions is known as _____
   a) Heat of hydrogenation b) Heat of combustion
   c) Latent heat d) Enthalpy of heat

SECTION – B

Answer any FIVE Questions : (5 × 2 = 10)

11. What is the action of heat on succinic acid?
12. How is phthalimide prepared?
13. NH_4CNS (HEAT) → ?
14. Assign E(Or) Z nomenclature to the following compound



15. Define resolution.
16. Mention the limitations of Bayer’s strain theory.
17. What is sandmayer reaction?

SECTION – C

Answer ALL Questions : (5 × 5 = 25)

18. a) How does phthalic acid react with
   i) Sodalime ii) PCl_5 iii) Ammonia

(OR)

b) i) How is malonic acid synthesised?
   ii) Write the Action of heat on malonic acid.
   iii) What happens when malonic acid heated with P_2O_5?

19. a) Distinguish between primary amine, secondary amine and tertiary amines.

(OR)

b) Write the general methods of preparation of amines.

20. a) What happens when aniline reacts with
   i) Chloroform and sodium hydroxide
   ii) Bromine water
   iii) C_6H_5CHO

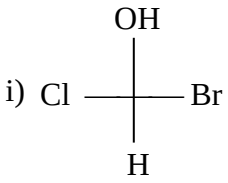
(OR)

b) What happens when nitrobenzene reacts with
   i) Sn/HCl ii) Nitrating mixture iii) Zn/NH_4Cl

21. a) Explain the optical isomerism of Latic acid.

(OR)

b) Assign R (or) S Notation

i)


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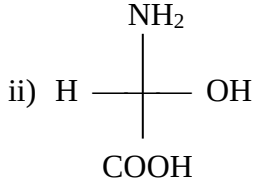

22. a) Draw the different conformational isomers of 1, 2 dichloroethane and comment on their stability.

(OR)

b) Draw the different conformational isomers of cyclohexane and comment on their stability.

SECTION – D

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

23. Write the preparation of the following compounds **(2 + 4 + 3 + 1)**

i) Adipic acid ii) Tartaric acid

iii) Maleic acid iv) Fumaric acid

24. What happens when urea reacts with

i) CH_3COCl ii) Action of heat iii) H_2O

iv) HNO_2 v) NH_2NH_2

25. What happens when benzene diazonium chloride reacts with

i) Amiline ii) KI iii) Cu/HCl

iv) Sn/HCl v) C_6H_6

26. Write a short note on i) Asymmetric synthesis

ii) Walden inversion

27. a) Explain Bayer's strain theory. **(7 + 3)**

b) Draw the chair and boat conformations of cis and trans decalins.

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B.Sc. Chemistry Degree (Semester) Examinations, November 2019
Part – III : Core Subject : Fifth Semester : Paper – II

INORGANIC CHEMISTRY – II
Under CBCS – Credit 4

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. According to Werner's theory of coordination compounds
   a) primary valency is ionisable
   b) secondary valency is ionisable
   c) primary and secondary valencies are ionisable
   d) neither primary nor secondary valency is ionisable
2. Both geometrical and optical isomerism are shown by
   a) $[Co(en)_2Cl_2]^+$ b) $[Co(NH_3)_5Cl]^{2+}$
   c) $[Co(NH_3)_4Cl_2]^+$ d) $[Cr(ox)_3]^{3-}$
3. Electronic configuration of $[Cu(NH_3)_6]^{2+}$ on the basis of crystal field splitting theory is
   a) $t_{2g}^5e_g^4$ b) $t_{2g}^6e_g^3$ c) $t_{2g}^9e_g^0$ d) $t_{2g}^4e_g^5$
4. Which one of the following complexes is John-Teller distorted?
   a) $[Co(NH_3)_6]^{3+}$ b) $[Cr(H_2O)_6]^{3+}$ c) $[Cu(H_2O)_6]^{2+}$ d) $[Fe(CN)_6]^{4-}$
5. Which statement is incorrect about the mechanisms of electron transfer?
   a) Electron transfer may occur by an inner or outer-sphere mechanism depending on the System
   b) Long range electron-transfers such as in cytochromes are most likely to occur by outer sphere mechanisms

c) Marcus-Hush theory applies to inner-sphere mechanisms

d) In an inner-sphere mechanism, electron transfer between two metal centres involves a bridging ligand

6. Trans effect is not shown by-

a) $[PtCl_4]^{2-}$ b) $[Pt(NH_3)_3Cl]^{1+}$

c) *cis*-$[Pt(NH_3)_2Cl_2]$ d) *trans*-$[Pt(NH_3)_2Cl_2]$

7. A value about which all other values in a set are equally distributed is

a) Mean value b) Median c) Precision d) None of the above

8. Uncertainty in the data

a) Relative Error b) Absolute Error c) Both a and b d) Certain Error

9. Find the odd one out based on electron transfer

a) Fe b) Cu c) Mn d) Co

10. In oxy-hemoglobin the sixth coordinated position of iron is occupied by

a) O_2 b) Histidine c) Pyrrole d) Cystine

SECTION – B

Answer any FIVE Questions : (5 × 2 = 10)

11. Apply EAN rule for the following complex i) $Fe_2(CO)_9$ ii) $V(CO)_6$.

12. Write down the formula for chlorobis (ethylene diammine) nitrito Ocobalt (III) ion and Potassium hexacyanoferrate(II).

13. Write down the distribution of d-orbital of octahedral field for d^6 low spin configuration and represent it number of unpaired electron in it.

14. Which one is labile and inert one?

i) $[Cr(H_2O)_6]Cl_2$

ii) $[Co(NH_3)_6]Cl_3$?

15. Differentiate Accuracy and Precision.

16. Write about the function and toxicity of Na and Cu in our body?

17. What is meant by essential and trace elements? Explain with examples.

SECTION – C

Answer ALL Questions : (5 × 5 = 25)

18. a) Write about the types of ligands with examples.

(OR)

b) Explain the geometrical isomerism of octahedral complexes.

19. a) How crystal field theory explain the d-orbital splitting in octahedral complex?

(OR)

b) Using Crystal field theory differentiate high spin and low spin complexes.

20. a) How S_N1CB mechanism followed in cobalt complexes?

(OR)

b) Through inner sphere mechanism explain the order of reaction as I<<II<III

i) $[Cr(H_2O)_6]^{2+} + [Co(NH_3)_6]^{3+} \rightarrow [Cr(H_2O)_6]^{3+} + [Co(NH_3)_6]^{2+}$

ii) $[Cr(H_2O)_6]^{2+} + [Co(NH_3)_5(H_2O)]^{3+} \rightarrow [Cr(H_2O)_6]^{3+} + [Co(NH_3)_5(H_2O)]^{2+}$

iii) $[Cr(H_2O)_6]^{2+} + [Co(NH_3)_5(OH)]^{2+} \rightarrow [Cr(H_2O)_5OH]^{2+} + [Co(NH_3)_5(H_2O]^{2+}$

21. a) How errors are classified and minimised?

(OR)

b) Write about Coprecipitation and Post precipitation.

22. a) Discuss the role of metal in anticancer drugs.

(OR)

b) Write about any five metal ion function and toxicity.

SECTION – D

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

23. a) Describe the Werner Theory of coordination complex?

b) Using VB theory explain the bonding, spin nature and magnetic properties of $[CoF_6]^{3-}$?

24. Using Jahn Teller Effect Explain how octahedral complexes get distorted?

25. What is meant by Trans effect and how it influence the rate of reaction?

26. a) Describe the method of least squares for the analysis of experimental data?

b) How precipitate is formed from homogeneous solutions?

27. Explain the role of haemoglobin as oxygen carrier in biological system?

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B.Sc. Chemistry Degree (Semester) Examinations, November 2019
Part – III : Core Subject : Fifth Semester : Paper – III

PHYSICAL CHEMISTRY – III
Under CBCS – Credit 4

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. The cell constant of a conductivity cell
   a) changes with change of electrolyte
   b) changes with change of concentration of electrolyte
   c) changes with temperature of electrolyte
   d) remains constant for a cell
2. Which statement is incorrect about a weak electrolyte?
   a) acetic acid is an example of a weak electrolyte
   b) The molar conductivity of a weak electrolyte remains approximately constant as the concentration increases
   c) A weak electrolyte is partially dissociated in aqueous solution
   d) at infinite dilution, a weak electrolyte is taken to be fully ionized
3. Greater value of standard reduction potential smaller will be tendency
   a) to form positive ions b) to form negative ions
   c) gain electrons d) all are possible
4. Assuming the species in their standard states, which of the following ions is the strongest oxidizing agent?
   a) Co^{3+} b) Fe^{2+} c) Cu^{2+} d) Cl^{-}
5. Aqueous copper sulphate solution is electrolyzed using platinum electrodes. The electrode reaction occurring at cathode is
   a) $Cu^{2+}(aq) + 2e^{-} \rightarrow Cu(s)$

b) $Cu(s) \rightarrow Cu^{2+}(aq) + 2e^-$

c) $2H_2O(l) \rightarrow O_2(g) + 4H^+(aq) + 4e^-$

d) $O_2(g) + 4H^+(aq) + 4e^- \rightarrow 2H_2O(l)$

6. Which of the following is not the characteristic of a reference electrode?

a) It must have a known output potential

b) It must have a constant output potential

c) Its output potential is dependent on the composition of the solution

d) It is employed in conjunction with the indicator or working electrode

7. A solution of quinine sulphate on exposure to visible light exhibits

a) Fluorescence b) phosphorescence

c) chemiluminescence d) none of these

8. The number of photons that pass through a unit area in a unit time is called

a) Amplitude of light b) frequency of light

c) intensity of light d) wavelength of light

9. At a triple point

a) Three phase coexists in equilibrium

b) The vapour pressure is equal to atmospheric pressure

c) There are three components in equilibrium

d) There are three degrees of freedom

10. Choose the correct system for formation of three pairs of partially miscible liquid

a) Acetic acid – chloroform – water

b) Phenol – aniline – water

c) Ethyl acetate – n-butyl alcohol – water

d) Succinic nitrile – ether – water

SECTION – B

Answer any FIVE Questions : (5 × 2 = 10)

11. Define equivalent conductance.
12. What is the difference between strong and weak electrolytes?
13. Define standard electrode potential.
14. How is emf calculated from equilibrium constant?
15. What is overvoltage?
16. State Lambert –Beer's law.
17. Give the mathematical form of reduced phase rule.

SECTION – C

Answer ALL Questions : (5 × 5 = 25)

18. a) What is Kohlrausch's law? How is it used to determine the degree of dissociation of an electrolyte?

(OR)

b) Give the principle for determination of solubility of sparingly soluble salt by conductance measurements.

19. a) Explain the components of calomel electrode. Give the redox reaction for its electrode potential.

(OR)

b) Derive Nernst equation and give its significance

20. a) What is the difference between primary and secondary cells? Discuss about the reversible reactions takes place in Lead acid battery.

(OR)

b) What is hydrogen overvoltage? Discuss about different mechanisms involved in hydrogen overvoltage.

21. a) i) State Stark–Einstein Law.

ii) Explain the concept of quantum efficiency with examples.

(OR)

b) What are the differences between thermochemical and photochemical reactions?

22. a) Explain'P' and 'F' values for H_2O using phase rule,by the variation of pressure and temperature.

(OR)

b) Construct the phase diagram for KI–H_2O system.

SECTION – D

Answer any THREE Questions : (3 × 10 = 30)

23. Write notes on the following: **(6 + 4)**

a) Debye – Huckel theory and Onsager equation.

b) Determination of transport number.

24. How is emf related to free energy, enthalpy, entropy and equilibrium constant?

25. i) How is pH determined by quinhydrone electrode? **(5 + 5)**

ii) Explain the redox titration curve between Fe^{2+} vs MnO_4^-.

26. Write notes on the following. **(3 + 3 + 4)**

i) Mathematical form of Lamberts–Beer's Law.

ii) Jablonski diagram.

iii) Photochemical kinetics of HBr.

27. i) Give the thermodynamic derivation of phase rule. **(4 + 6)**

ii) Explain Pattinson's process in the separation of silver from lead.

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B.Sc. Chemistry Degree (Semester) Examinations, November 2019
Part – III : Elective Subject : Fifth Semester : Paper – I

COMPUTER APPLICATION IN CHEMISTRY AND GREEN CHEMISTRY
Under CBCS – Credit 5

Time: **3** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. Which of the following is the internal memory of the computer
   a) CPU register b) Cache c) Main memory d) All of these
2. The fourth generation computer _____
   a) Mark 1 b) ENIAC c) IBM PC d) EDSAC
3. _____ Number System is used by the computer systems.
   a) Decimal b) Binary c) Octal d) Hexadecimal
4. Repeated sequence is an example of _____
   a) Input b) control statement
   c) Output d) Simple sequence
5. First version of Microsoft word was developed by _____
   a) Bill Gates b) Paul Allen
   c) Charles Simonyi d) Charles Babbage
6. Database management system (DBMS) is a collection of _____ that enables user to create and maintain a database.
   a) Keys b) Translators
   c) Program d) Language Activity
7. The normal synthetic chemistry is termed as _____
   a) Green b) Brown c) Red d) Blue
8. Which one is Greener catalyst?
   a) Silica b) Nickel c) Rhodium d) Platinum

9. The 12 principles of Green chemistry was introduced by

a) Paul K. Hedge b) Werner

c) Franklin d) Paul T. Anastas

10. The atom economy of the following reaction is

$CH_4 + 2\,O_2 \longrightarrow 2\,H_2O + CO_2$

a) 45% b) 55% c) 65% d) 35%

SECTION – B

Answer any FIVE Questions : (5 × 2 = 10)

11. What are the basic units of computer system?
12. What makes a computer powerful?
13. Covert to octal number. i) $(10101)_2$ ii) $(111)_2$
14. What is Microsoft Word used for?
15. Give the significance of CHEMDRAW.
16. Green chemistry is a sustainable chemistry. Justify.
17. Who has developed the concept of green chemistry?

SECTION – C

Answer ALL Questions : (5 × 5 = 25)

18. a) i) Explain in brief the characteristics of computers.
ii) Explain the limitations of computers.

(OR)

b) Explain the classification of computers on the basis of their capacity to access memory and size.

19. a) Write the comparison between main memory and secondary memory.

(OR)

b) Write a note on various symbols used in flowchart. Draw a flow chart to calculate the sum of 1st fifty natural numbers.

20. a) Write about the basic concept of creating and accessing databases using MS Access.

(OR)

b) List the various salient features of MS WORD for typing texts and tabular columns.

21. a) Justify the statement – The need for green chemistry.

(OR)

b) Write in detail about the various environmental protection laws for eco-friendly environment.

22. a) Explain of scope of green chemistry.

(OR)

b) Write notes on inception and evolution of green chemistry.

SECTION – D

Answer any THREE Questions : (3 × 10 = 30)

23. a) What is the application software? Explain with the help of examples.

b) Write short notes on **(2 + 2 + 2 + 2 + 2)**

i) Operating system ii) Compiler

iii) Assembly language iv) Control unit

24. Explain the specification and syntax and semantics of programming languages.
25. How will you draw a chemical structure and paste them in the text. Explain with suitable example.
26. Green chemistry is important in alternate reaction pathway. Explain with suitable example.
27. What are the 12 principles of green chemistry? Explain.

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B.A. / B.Sc. Degree (Semester) Examinations, November 2019
Part – IV : Non-Major Elective Subject : First Semester : Paper – I

FOOD CHEMISTRY
Under CBCS – Credit 2

Time: **2** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. Carbohydrates provide _____ to our body.
   a) Energy b) Food c) Strength d) Weak
2. The actual time the food cooks with microwave energy.
   a) Microwave time b) Standing time
   c) Convection d) Microwaving
3. The first spice used by man is _____.
   a) Saffron b) Pepper c) Cardamom d) Cinnamon
4. The pigment imparts yellow colour to Turmeric
   a) Xanthophyll b) Anthocyanin c) Kurkumin d) Haemoglobin
5. Sugar is adulterated with
   a) Chalk powder b) Fat and oil c) Sand d) All of these
6. Prevention of Food adulteration Act was passed by the Parliament in
   a) 1948 b) 1950 c) 1955 d) 1976
7. Which one among the following is used for the preservation of fruit juices?
   a) Ethylene dibromide b) Sodium thiosulphate
   c) Sodium benzoate d) Tartaric acid

8. Which of the following is a naturally occurring antioxidant?

a) Hydroquinone b) Ascorbic acid

c) Vitamin E d) All of the mentioned

9. National Center of Organic Farming is in

a) Nagpur b) Kochi c) Gangtok d) Ghaziabad

10. A protein rich organism is

a) Spirulina b) Chlamydomonas

c) Ulothrix d) Oedoganium

SECTION – B

Answer any FIVE Questions : **(5 × 2 = 10)**

11. Write any two Nutrients and their sources.

12. Write any three advantages of soaking process.

13. Define the term 'Spices' with examples.

14. Mention the characteristics and medicinal value of Ajwain(Omum).

15. Define Food Adulteration with suitable examples.

16. Mention any three chief causes for food spoilage.

17. What is meant by Organic foods and give suitable examples?

SECTION – C

Answer ALL Questions : **(3 × 9 = 27)**

18. a) Explain briefly about the functions of food in energy yielding and body building.

(OR)

b) Write any five nutrients, deficiency and their sources.

19. a) Discuss the advantages of using onion and garlic in our diet.

(OR)

b) Explain the methods available to detect the following adulterants.

i) Ghee ii) Black pepper iii) Wheat iv) Sugar v) Milk

20. a) Write down the principles of Food preservation.

(OR)

b) Mention the potential uses of food irradiation.

SECTION – D

Answer any TWO Questions : **(2 × 14 = 28)**

21. Explain in detail about the following methods and their advantagesin cooking process.

i) Boiling ii) Pressure cooking iii) Microwave cooking

22. Briefly note down the benefits of following Indian spices.

i) Black Pepper ii) Ginger iii) Somfu iv) Turmeric

23. Write briefly about the Indian AGMARK Standard.

24. a) Explain the following terms in detail. **(7 Marks)**

i) Freezing

ii) Pasteurization

iii) Canning of acid and non-acid foods

b) Write down the food irradiation process and its uses. **(7 Marks)**

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B.Sc. Chemistry Degree (Semester) Examinations, November 2019
Part – IV : Skill Based Subject : Third Semester : Paper – I

MEDICINAL AND PHARMACEUTICAL CHEMISTRY
Under CBCS – Credit 2

Time: **2** Hours Max. Marks: **75**

SECTION – A

Answer ALL Questions : **(10 × 1 = 10)**

1. Deep cuts out of rusted objects may result in
   a) haemorrhage b) titanus c) rashes d) swelling
2. The color of blood, when it is bleeding from a vein is
   a) brownish red b) bluish red c) blackish red d) merun red
3. The science that deals with principles of active agents of drugs is called
   a) pharmacy b) pharmacology
   c) pharmacodynamics d) pharmacokinetics
4. Histamine is an _____ agent.
   a) antiallergic b) antiprotazoal c) antibacterial d) antifungal
5. The first inhalation anaesthetic which was discovered in 1776 is:
   a) cuprous oxide b) nitrous oxide
   c) ferric oxide d) none of the above
6. The compound which has gained reputation as “truth serum” is:
   a) thio pental sodium b) benzocaine
   c) methohexitone d) amethocaine
7. Which among the following is called ‘oil of winter green’
   a) methyl salicylate b) sodium salicylate
   c)diethylamine salicylate d) salicin

8. Which among the following statement is incorrect: Morphine is
   a) white in colour b) odourless nature
   c) obtained from poppy plant d) amorphous compound
9. The term 'septic' means:
   a) ugly b) germs c) pungent d) rot
10. Chemical name of Dettol is:
   a) 4-chloro-3,5-xylenol b) 4-chloro-3-methylphenol
   c) 2-isopropyl-5-methylphenol d) None of the above

SECTION – B

Answer any FIVE Questions : **(5 × 2 = 10)**

11. Write down the contents of first aid box.
12. Define Pharmacophore.
13. Define the two types of anaesthetics.
14. What is the chemical name of Ibuprofen. Mention one of its use.
15. State the two types of narcotic analgesics with examples.
16. Define phenol coefficient. Write down its value for
   i) Phenol ii) 4nbutyl cresol
17. Draw the structure of any two nitro furan derivatives.

SECTION – C

Answer ALL Questions : **(3 × 9 = 27)**

18. a) Give a short note on chemotherapeutic drugs.

(OR)

b) Discuss i) Pharmacodynamics ii) Pharmacognosy
iii) Antimetabolites

19. a) What are the requisites of Local anaesthetics? Write the structure and therapeutic use of cocaine and benzocaine.

(OR)

b) Give the structure, mode of action and uses for the following analgesics: i) Morphine ii) Pethidine iii) Methadone

20. a) State the conditions for an antiseptic/disinfectant to be ideal. Also write the differences between antiseptics and disinfectants with examples.

(OR)

b) Give the structure, properties and uses for the following alkyl substituted phenols: i) Cresol ii) Lysol iii) Thymol

SECTION – D

Answer any TWO Questions : **(2 × 14 = 28)**

21. Define first aid. Jot down its basic rules. Write the same for:
   i) bleeding ii) burns iii) fainting
22. Elaborate on the chemical structure, properties, advantages and disadvantages of the following anaesthetics: a) Vinyl Ether
   b) Chloroform c) Trichloroethylene d) Cyclopropane
23. Explain in detail the classification of Non-narcotic analgesics.
24. Discuss the chemical structure and uses of the following antiseptic / disinfectant: a) Thiomersol b) Nitromersol c) Dichloramine T
   d) Formalin e) Gluteraldehyde

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