Total No. of Printed Pages: 2

SUBJECT CODE NO: - Y-2001
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. F.Y (Sem-I)
Examination March / April - 2023
Chemistry Paper-I (Inorganic Chemistry)

[Time: 1:30 Hours] **[Max. Marks: 50]**

Please check whether you have got the right question paper.

N. B
1) Attempt all the questions
2) All question carry equal Marks.
3) Illustrate your answer with suitable labelled diagram

Q1 a) What are quantum numbers? Explain principle quantum number? 10

b) Discuss the trend of atomic & Ionic radii in period and group? 10

OR

c) What is diagonal relationship? Explain the diagonal relationship of Li and Mg 10

d) Define electronegativity? How does it vary along with period and group? 10

Q2 a) State & explain Pauli's exclusion and Aufbau principle. 10

b) What are inter halogen compounds? Explain its types 10

OR

write a notes on any four of the following 20

a) Trends of lionization potential in the periodic table

b) Factors affecting on electronegativity

c) Postulates of Bohr's atomic theory

d) Hydrides of group 13 elements.

e) Heisenberg's uncertainty principle

Q3 Attempt the following 10

1) Electronegativity is the tendency of atom to_____.

   a) Accept electron

   b) Loss electron

   c) shair electron with other atoms

   d) Attract bonding electrons

2) Choose the correct statement from the following.

   a) cation and anion are equal in size

   b) cation is larges in size than parent atom

   c) cation is larger in size than anion

   d) anion is larges in size than parent atom

3) The Valence shell electron structure of an element is ns^2 np^2 the element will belong to the group of_____.

   a) Alkali metals b) Inert metals c) Noble gases d) Halogens.

4) Shape of "d' orbital is_____.

   a) Dumb bell b) spherical c) double dumb-bell d) None of these

5) which of the following is most electronegative

   a) Tin b) carbon c) Lead d) silicon

6) Which of the following is inter halogen compound?

   a) Kcl b) Icl_3 c) Hcl d) Nacl

7) In the long form of periodic table, all the non-metals are placed under

   a) s-block b) p-block c) d-block d) f-block

8) Bond Angle is minimum for____.

   a) H_2O, b) H_2S c) H_2 Se d) H_2Te

9) Which of the following is alkaline earth metal?

   a) Li b) Mg c) Rb d) K

10) From following which hydride is more acidic in nature?

   a) H_2O b) H_2S c) H_2 Se d) H_2Te

Total No. of Printed Pages: 02

SUBJECT CODE NO: - Y-2002
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. F.Y (Sem-I)
Examination March / April - 2023
Chemistry Paper-II (Organic Chemistry)

[Time: 1:30 Hours] **[Max. Marks: 50]**

Please check whether you have got the right question paper.

N. B 1) Attempt all the question
2) All questions are compulsory.

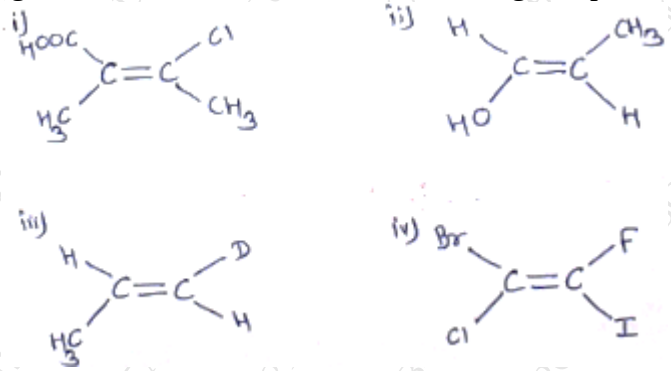
Q1 a) Explain Inductive effect and steric effect with Suitable example. 10
b) Explain different types of organic reactions with examples 10

OR

a) i. Discuss localised and delocalised chemical bond with example 05
ii. Explain hydroboration reaction of alkene with mechanism 05

b) Define electrophiles and nucleophiles and- discuss with suitable example 10

Q2 a) Assign E or Z nomenclature to the following compound. 10



b) i. Explain any two methods of preparation of alkene 05
ii. Explain Sulphonation reaction of benzene with mechanism 05

OR

Write short notes on (any four) 20

a) D-L System of nomenclature
b) Enantiomer
c) Nitration of alkanes
d) Saytzeff rule
e) Friedel craft acylation
f) Any two methods of preparation of aryl halides.

Q3 choose and write the correct answer of following 10

1. Which of the following compounds has localized bonding?
   a) Benzene b) 1, 3 – butadiene c) conjugated alkene d) methane

2. Homolytic fission of a compound results in formation of
   a) Carbocation b) Carbanion c) free radical d) Carbene

3. Which of the following is an electrophile?
   a) CH_3O^- b) $CH_3CH_2^+$ c) NH_3 d) $CH_3CH_2^-$

4. Plane polarized light is affected by _____
   a) Identical molecules b) chiral molecules c) Both a & b d) none of these

5. Optical isomers that are not mirror images are called __
   a) Diastereomer b) Meso Compound c) Enantiomer d) Metamer

6. The thermal decomposition of alkane in the absence of air is called ____
   a) Cracking b) Hydrogenation c) Combustion d) Oxidation

7. Ethylene is obtained from ethyl bromide by _____
   a) Simple heating
   b) Hydrolysis
   c) Dehydrohalogenation
   d) Nucleophilic Substitution

8. The disappearance of purple colour of KM_nO_4 Solution on reaction with alkene is known as _____
   a) MArkownikoff's test
   b) Bayers test
   c) Grignard test
   d) None of these

9. Benzene reacts with chlorine in the presence of $FeCl_3$ Catalyst to form.
   a) Chlorobenzene
   b) Bromobenzene
   c) Hexachlorobenzene
   d) Hexachlorocyclohexane

10. Chlorination of $C5_2$ gives _____
    a) CS_2Cl_2 b) $COCl_2$ c) $CHCl_3$ d) CCl_4

Total No. of Printed Pages: 03

SUBJECT CODE NO: - YY-2333
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. F.Y (Sem-II)
Examination March / April - 2023
Chemistry Paper-IV Physical Chemistry

[Time: 1:30 Hours] **[Max. Marks: 40]**

Please check whether you have got the right question paper.

N. B 1) All questions are compulsory.
2) All questions carry equal marks.

Q1 Define system.

Write various types of system with suitable examples. 10

OR

Explain in brief.

a) Hess's law of constant heat summation. 05

b) Effect of change of temperature on equilibrium state of reaction. 05

Q2 Derive the Kinetic gas equation. 10

OR

a) Discuss factors affecting rate of reaction. 05

b) Hydrolysis of ethyl acetate by NaoH with equal concentration of reactants gave the following data 05

Time (min)	0	5	15
Vol. of acid (Ml)	16.0	10.5	6.0

Show that reaction is of second order.

Q3 Write short notes on (any 2) 10

a) Various statements of second law of thermodynamics.

b) Le-chatelier's principle

c) Postulates of kinetic theory of gases

d) Rate constant

Q4 Multiple choice question. 10

1) Among the following, intensive property is
   a) Density
   b) Viscosity
   c) Both a & b
   d) None of these

2) Hot water in a beaker is an example of
   a) Closed system
   b) Isolated system
   c) Open system
   d) None of these

3) Standard heat of enthalpy is assumed to be zero for _____
   a) Graphite
   b) Diamond
   c) Charcoal
   d) Lamp back

4) Hess's law is related to _____
   a) Constant heat summation
   b) Enthalpy of formation
   c) Free energy
   d) All of the above

5) Equilibrium reaction are characterized by
   a) Going to completion
   b) Of being non spontaneous
   c) The presence of both reactants and products in a definite proportion
   d) Both a & b

6) The compressibility factor for an ideal gas is
   a) 3
   b) 1.5
   c) 1
   d) 2

7) Kinetic gas equation is given by relation
   a) $Pv = \frac{3}{1}mnv^2$
   b) $Pv = {}^{1}/_{3}\,mnx^2$
   c) $Pv = \frac{1}{2}mnv^2$
   d) $None\ of\ these$

8) On increasing the concentration of reactant, the rate of reaction will
   a) Decrease
   b) Increase
   c) No change
   d) None of these

9) When the rate of reaction is equal to the rate constant, the order of the reaction is
   a) Third order
   b) Second order
   c) Zero order
   d) First order

10) $K = \frac{2.303}{t} \quad \log \frac{a}{a-x}\ is\ a$
   a) First order rea^{n}
   b) Second order rea^{n}
   c) Zero order
   d) Half life order

Total No. of Printed Pages: 2

SUBJECT CODE NO: - Y-2007
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. F.Y Sem. II
Examination March / April - 2023
Chemistry Paper-IV (Physical Chemistry)

[Time:1.30 Hours] **[Max. Marks:50]**

Please check whether you have got the right question paper.

N. B 1) Attempt all questions
2) Illustrate your answer with suitable diagram

Q1 Derive Vander Waal's equation of state. Deduce Boyle's law and Avogadro's law 20

OR

Differentiate between crystalline and amorphous solids. Derive Bragg's equation

Q2 Derive the rate equation for zero order reaction. Explain types of catalysis with suitable example. 20

OR

Write short notes on any four

a) For the following equation. Calculate the slope and intercept of lines
   i) 5x+2y=8
   ii) 7x-3y+5=0

b) Using logarithm solve
   i) $352 \div 132$
   ii) 721×128

c) Distinguish between liquid & gases
d) Nematic and cholestryl liquid crystal
e) Optical properties of colloids
f) Concept of Activation energy

Q3 Multiple choice questions 10

1) PV= -------- is the kinetic gas equation.
   a) $\frac{1}{2}mv^2$ b) $\frac{1}{3}mnv^2$ c) $\frac{1}{3}mv$ d) $\frac{1}{4}mn$

2) $n_1 = n_2$ represents ----- hypothesis
   a) Debroglie's b) Avogadro's c) both a & b d) none of these

3) $K = \frac{2.303}{t} \log \frac{a}{(a-x)}$ is the rate equation for -----order of reaction.
   a) Zero b) first c) second d) Pseudo

4) The rate of reaction increases with the ----of Pressure.
   a) Increase b) decrease c) both a & b d) None of these

5) The intermediate state between solid and liquid is --------
   a) Solid b) liquid c) gases d) liquid crystal

6) Gelatin is an example of ----------
   a) Gel b) Emulsion c) sol d) none of these

7) The scattering of light is due to ---------effect.
   a) Brownian b) Tyndall c) Compton d) none of these

8) ----are compressible
   a) Solid b) gases c) both a & b d) none of these

9) $\log 400 =$----------
   a) 1.00 b) 2.00 c) 3.00 d) 4.00

10) Slope of straight line is ----------
   a) $y = x + mc$ b) $y = mx$ c) $y = \frac{mx}{c}$ d) $y = mx + c$

Total No. of Printed Pages: 2

SUBJECT CODE NO: - YY-2334
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. F.Y (Sem-II)
Examination March / April - 2023
Chemistry Paper-V Applied Chemistry

[Time: 1:30 Hours] **[Max. Marks: 40]**

Please check whether you have got the right question paper.

N. B
1) All questions are compulsory.
2) All questions Carry equal marks
3) Draw neat diagram and give labels wherever necessary

Q1 a) What is the principle of paper Chromatography? Explain the paper chromatography in detail. 10

OR

b) Explain is brief
i) Classification of drugs.
ii) Preparation of paracetamol

Q2 a) Explain the process of manufacture of glass. 10

OR

b) Explain in brief
i) Concept of chromophore
ii) Concept of auxochrome

Q3 Write short notes on (any two) 10
a) Determination of R_f value
b) Properties of ideal drug
c) Varieties of glass
d) Types of fertilizers

Q4 Choose Correct option for the Following 10
1) Chromatography is a physical method that is used to separate and analyse _____
(a) Complex mixture (b) simple mixture
(c) Amino acid (d) All of these
2) Preparation of TLC plate is done by _____
(a) Dipping (b) spreading (c)Spraying (d) All of these

3) _____ are used as adsorbents.
   (a) Activated alumina (b) Silica gel
   (c) Molecular sieve (d) All of these
4) Which of the following functional group in paracetamol?
   (a) Anilide (b) phenolic-OH (c) Both a & b (d) None of these
5) Glass is a mixture of _____
   (a) Metallic silicates (b) Non metallic silicates
   (c) Metallic acetate (d) Metallic Carbonates
6) How many different types of glasses are there?
   (a) 4 (b) 10 (c)15 (d) 1
7) Select the wavelength range Corresponding to uv-vis region
   (a) 400-800 mm (b) 25 μm-2.5 μm
   (c) 200-800nm (d) 2.5μm – 1 mm
8) The possible transitions for water molecule in uv-visible region are
   (a) 6-6* (b) n-π*, π- π * (c) 6-6*, n-π* (d) n-6*
9) Bathochromic shift is also Called _____ shift.
   (a) Red (b) Violet (c) blue (d) yellow
10) Urea is _____ fertilizer.
   (a) phosphorus (b) Nitrogenous (c) Potash (d) None of these

Total No. of Printed Pages: 2

SUBJECT CODE NO: - Y-2008
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. F.Y (Sem-II)
Examination March / April - 2023
Chemistry Paper- V Inorganic Chemistry

[Time: 3:00 Hours] **[Max. Marks: 50]**

Please check whether you have got the right question paper.

N. B 1) Attempt all questions
2) Illustrate your answer with suitable labelled diagram

Q1 a) Give the structure and bonding in xeF_2 10
b) Explain the formation of SF_4 molecule with the help of VSEPR theory. 10

OR

a) What is hybridisation? explain SP^2 hybridisation with suitable example 10
b) Explanation the formulation of IF_7 10

Q2 a) Write the properties of β & Y −particles 10
b) Discuss in detail study about internal and external indicator 10

OR

Write short notes on any two 20
a) Packing fraction
b) Importance of indicator
c) Chemistry of Xenon
d) Homonuclear diatomic and Heteronuclear diatomic molecules

Q3 Select the correct option for each of the following 10

1) Electronic configuration of He is -------
a) $1s^2$ b) $2s^2$ c) $3s^2$ d) $4s^2$

2) Bond order of He_2 is ----------
a) Zero b) one c) Two d) Three

3) -------is the best complexing agent
a) NH_3 b) $O\bar{H}$ c) EDTA d) H_2O

4) The elements of group 18 are
a) Alkali metal b) Lanthanides c) Halogens d) Noble gas

5) The phenomenon of Radioactivity is given ----------
   a) Henry Becquerel b) Heitler and London
   c) Panling & slater d) None of these

6) The shape of ClF_3 molecule is
   a) Triangular planar b) T-shaped c) V-shaped d) see-saw

7) The hybridised state of xeF_6 is ----------
   a) SP^3 b) Sp^3d^2 c) $SP^3\ d^3$ d) SP^2

8) The process of carbon dating is useful for calculating ----------
   a) Acid value b) age c) Medicine value d) All of these

9) VSEPR theory was proposed by -----
   a) Gillespie b) Rutherford c) Bohr d) sidwick & Bowell

10) $KMnO_4$ is -----indicator
   a) Self b) Litmus c) acid base d) none of these

Total No. of Printed Pages: 3

SUBJECT CODE NO: - Y-2005
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. S.Y (SEM-III)
Examination March / April - 2023
Chemistry Paper-VII (Organic Chemistry)

[Time: 1:30 Hours] **[Max. Marks: 50]**

Please check whether you have got the right question paper.

N. B 1) Attempt all questions
2) Use blue or black pen only

Q1 a) How will you prepare following from ethanol 10
i) Ethyl acetate
ii) Ethyl chloride
iii) Ethene
iv) Acetic acid

b) Explain the following reaction with mechanism 10
i) Knoevenagel condensation reaction
ii) Claisen rearrangement

OR

a) Explain following reaction with mechanism 10
i) Mannich Reaction
ii) Fries Rearrangement

b) How will you prepare Acetic acid from following 10
i) CO_2
ii) CH_3CN
iii) CH_3COCl
iv) CH_3CONH_2
v) $CH_3COOC_2H_5$

Q2 a) How will you prepare primary amines from the following? 10
i) Nitromethane
ii) Methyl cyanide
iii) Acetaldehyde

b) Explain the following reactions 10
i) Hoffmann-bromamide reaction
ii) Diazotization reaction of amine

OR

a) Write short notes on following (any four) 20

i) Pinacol – pinacolone rearrangement
ii) Acidic nature of phenol
iii) Benzoin condensation
iv) Preparation methods of tartaric acid
v) Basic Nature of amines
vi) Distinguish pri, sec and tertiary alcohol by oxidation reaction

Q3 Choose and write the correct answer of the following questions 10

1) The reaction of carboxylic acid with alcohol catalysed by cone. H_2SO_4 is called as ____

a) Dehydration b) Esterification
c) Saponification d) Neutralization

2) What is the commercial method of preparation of phenol?

a) Cumene process b) Dows process
c) From diazotization salt d) None of these

3) Which of the following reagent may be used to distinguish between phenol and benzoic acid?

a) Tollen's reagent b) Aq. NaoH
c) Neutral $Fecl_3$ d) $Fecl_3$

4) Acetophenone is prepared from which of the following reaction?

a) Sandmeyer Reaction
b) Wurtz Reaction
c) Friedel crafts Reaction
d) All of these

5) Oxidation of isopropyl alcohol gives _____

a) Acetaldehyde b) ether
c) Acetic acid d) Acetone

6) Which class of the compound shows H-bonding even more than in alcohol?

a) Aldehyde b) carboxylic acid
c) phenol d) ether

7) Which of the following is the strongest acid?

a) FCH_2COOH b) $ClCH_2COOH$
c) CH_3COOH d) $BrCH_2COOH$

8) Reduction of Nitro alkanes gives ____
   a) Alcohol b) Amine
   c) Ester d) None of these

9) Which of the following compound is expected to be most basic?
   a) Methyl amine b) ethyl amine
   c) Hydroxyl amine d) None of these

10) Ethyl amine undergoes oxidation in the presence of $KMnO_4$ to from which compound?
   a) Acid b) alcohol
   c) Nitrogen oxide d) aldehyde

Total No. of Printed Pages: 2

SUBJECT CODE NO: - Y-2006
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. S.Y (SEM-III)
Examination March / April - 2023
Chemistry Paper-VIII (Physical Chemistry)

[Time: 1:30 Hours] **[Max. Marks: 50]**

Please check whether you have got the right question paper.

N. B 1) Attempt all questions.
2) Illustrate your answer with suitable diagram.

Q1 a) State intensive and extensive properties with suitable examples. 10
One mole of an ideal gas at 25 °C is allowed to expand reversibly at constant temperature from a volume of 10 litres to 20 litres. Calculate the work done by the gas in Joules. (R = 8.314 J/mol-K)

b) Explain Gibbs Function (G) as criteria for thermodynamic equilibrium and spontaneity. 10

OR

c) Define molar heat capacity at constant pressure and volume. Prove that $C_P - C_V = R$ 10

d) write various statements of second law of thermodynamics. 10

Q2 a) Derive an expression for total work done in the Carnot Cycle. 10

b) Derive Clausius-Clapeyron equation and give its applications. 10

OR

c) write short notes on any four of the following. 20
a) Concept of maximum work done.
b) Hess's law of constant heat summation with its application.
c) Define entropy with physical significance.
d) Helmholtz work function
e) Law of mass action.
f) State and Explain Le- Chateliers principle.

Q3 Multiple choice questions. 10

1) The efficiency of heat engine operating between 400 K and 200 K is
A) 0.25 B) 0.50 C) 0.75 D) 1.00

2) In an exothermic reaction ΔH is
A) Positive B) Zero C) Negative D) None of these

3) A measure of the degree of disorder of a system is known as
A) Entropy B) Enthalpy C) Efficiency D) Isotropy

4) The Clausis-Clapeyron equation helps to calculate
A) Latent heat of vaporization B) Boiling point or freezing point
C) Vapour pressure at one temperature if another temperature is given
D) All of the above

5) Which of the following expression is true
A) G = E + TS B) G = E - TS C) G = H - TS D) G = H + TS

6) The first law of thermodynamics states that energy can
A) be created B) be destroyed
C) be converted D) Neither be created nor be destroyed

7) The term R ln $K_P°$ is equal to
A) $-\Delta G/T$ B) $-\Delta G°/T$ C) $-\Delta G$ D) $-\Delta G°$

8) In a Carnot cycle, heat is transferred at
A) constant pressure B) constant volume
C) constant temperature D) constant enthalpy

9) Catalyst increases rate of reaction by
A) Shifting the equilibrium to right B) shifting the equilibrium to left
C) increasing activation energy D) lowering activation energy

10) Chemical system is at equilibrium
A) When the rate of Forward reaction becomes zero
B) When the rate of forward and reverse reaction are equal
C) When all the reactants having used up
D) When the rate of forward and reverse reaction are both zero

Total No. of Printed Pages: 2

SUBJECT CODE NO: - Y-2011
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. S.Y (Sem-IV)
Examination March / April - 2023
Chemistry Paper-X (Inorganic Chemistry)

[Time: 1:30 Hours] **[Max. Marks: 50]**

Please check whether you have got the right question paper.

N. B 1) All Questions are compulsory

Q1 a) Explain the variable oxidation States shown by elements of First transition series. Discuss the trends of ionisation Potential and atomic radii among first transition series. 10

b) Explain WERNER'S Theory With its salient Features & As experimental Verification with two Suitable examples. 10

OR

a) What are Solvents? Explain the types of solvents with Suitable examples. 10

b) Describe Bronsted - Lowry concept of acid-base with reference to Following Points. 10
1) Definition. 2) Conjugate acid-base pairs

Q2 a) What are Lanthanides? Give the electronic configuration of Lanthanide series. Discuss occurrence & Position in periodic 10

b) Define Isomerism, and classify them, discuss any two types of Isomerism with Suitable Examples. 10

OR

c) Write Short Notes on (any four) 20

1) Lanthanide contraction
2) Magnetic properties of 3d Series elements:
3) Assumptions of Valence Bond Theory
4) Water as a non-aqueous solvent.
5) Arrhenius concept of acid & bases.
6) Lux-Flood concept of acid & base.

Q3 Multiple Choice Questions 10

1) The electronic configuration of Copper is

   a) $3d^9 45^2$ b) $3d^{10}\ 45^1$ c) $3d^8\ 45^2$ d) d) $3d^{10}\ 45^2$

2) The oxidation state of Ni in $[Ni\ (CD)_4]$ is

   a) 0 b) 1 c) 4 d) 3

3) Maximum Magnetic Moment is exhibited by

   a) Cn++ b) Co++ d) Fe +++ d) Cr +++

4) Which ion is diamagnetic

   a) V++ b) Cr ++ c) SC +++ d) Ti ++

5) Which of the Following is protegenic Solvent

   a) CH_3COOH b) H_2O c) CH_3OH d) Pyridine

6) Which of the following Lewis acid?

   a) $AlCl_3$ b) Ncl_3 c) NH_3 d) Pcl_3

7) Which of the following is not Lanthanide element?

   a) Pr b) Pm c) Gd d) Th

8) Atomic Radii of first transition Series is

   a) increases b) Decreases c) Remains same d) None of These

9) EAN OF $[\ Co\ (NH_3)_6]^{3+}$ is

   a) 35 b) 37 c) 36 d) 54

10) According to Lux – Flood concept an acid is

   a) Proton donor b) e- donor c) Accepts Oxide ion d) None of these

Total No. of Printed Pages: 3

SUBJECT CODE NO: - Y-2012

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. S.Y (Sem-IV)

Examination March / April - 2023

Chemistry Paper-XI (Physical Chemistry-II)

[Time: 1:30 Hours] **[Max. Marks: 50]**

Please check whether you have got the right question paper.

N. B
1) Attempt all questions.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculator is allowed.

Q1 a) What is phase rule? Explain the terms involved in it with suitable example. 10

b) Discuss the lead-silver system with phase diagram. 10

OR

c) Explain Ostwald's dilution Law-calculate specific conductance when 0.1 solution of a salt is placed between two platinum electrodes 2cm. apart and area of cross section 4 cm^2 has a resistance of 200 ohms. 10

d) State and explain Kohlrausch's law. Give its applications. 10

Q2 a) Define reversible electrode. Discuss different types of reversible electrodes with suitable example. 10

b) Derive Henderson-Hasselbalch equation. 10

OR

Write short notes. (Any four) 20

a) Nicotine-water system.

b) Ideal and non-ideal solutions.

c) Arrhenius theory of electrolytic dissociation.

d) Wet corrosion.

e) Electrochemical series.

f) Types of conductometric titrations.

Q3 Choose and write the correct answer of the following. 10

1. Triple point of water system is _____.
   a) Monovariant
   b) Divariant
   c) Trivariant
   d) Invariant
2. Critical solution temperature of phenol-water system is _____.
   a) 60°C
   b) 68°C
   c) 80°C
   d) 100°C
3. The critical pressure of water system is ____.
   a) 1 atm
   b) 100 atm
   c) 218 atm
   d) 500 atm
4. The phase rule was first discovered by _____.
   a) Nernst
   b) Arrchenius
   c) Gibbs
   d) Bohr
5. Ostwald's dilution law is applicable by _____.
   a) Acids
   b) Bases
   c) Strong electrolytes
   d) Weak electrolytes

6. The unit of cell constant is _____.
   a) Cm^{-1}
   b) Cm2
   c) Cm
   d) Cm^{-2}
7. Sodium acetate is salt of _____.
   a) Weak acid and weak base
   b) Weak acid and strong base
   c) Strong acid and strong base
   d) Strong acid and weak base.
8. Daniell cell is an example of _____.
   a) Irreversible cell
   b) Reversible cell
   c) Both
   d) None of these
9. The PH of acid solution is _____.
   a) Equal to seven
   b) Below the seven
   c) Above the seven
   d) None of these
10. In an electrolytic conduction the fraction of the total current carried by the cation or anion is called its _____.
   a) Atomic number
   b) Mass number
   c) Gold number
   d) Transport number

Total No. of Printed Pages: 3

SUBJECT CODE NO: - Y-2003
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. T.Y (Sem-V)
Examination March / April - 2023
Chemistry Paper – XIII (Physical Chemistry)

[Time: 1:30 Hours] **[Max. Marks: 50]**

Please check whether you have got the right question paper.

N. B
1. Attempt all questions.
2. Figures to the right indicate full marks.

Q1 a) State and explain postulates of Bohr's theory. Give its limitations. 10

b) Derive an equation for moment of inertia of diatomic rigid rotator. The rotational spectra of diatomic molecule consists of equidistant lines with a spacing of 20 cm^{-1}. Calculate the bond length of a molecule if its reduced mass is 2.8×10^{-24} gm. 10

OR

c) Derive de Broglie's equation. Calculate de Broglie's wavelength of an electron moving with velocity 2.44×10^{8} cm/s. (mass of electron = 9.1×10^{-28} gm, Planck's constant, $h = 6.62 \times 10^{-27}$ erg sec) 10

d) Describe basic components of spectrometer. 10

Q2 a) State and explain laws of photochemistry. Calculate quantum yield when 0.04 mole of substance was exposed to light for 15 minutes and absorbs 2×10^{6} photons per second. 10

b) What is optical activity? How it is measured? 10

OR

Write short notes on any four of the following. 20

a) Principal and Azimuthal quantum number
b) Regions of electromagnetic spectrum
c) Photosensitised reactions
d) Application of dipole moment in determination of molecular structure
e) High energy ball milling method
f) Synthesis of nano material by micro emulsion method.

Q3 Select and write the correct answer of the following. 10

1) The wavelength of maximum intensity of radiation is inversely proportional to absolute temperature of black body this statement is known as ----------
   a) Wein's law
   b) Stephens law
   c) Planck's law
   d) Boyle's law

2) When spectrum kept in magnetic field then lines of a spectrum get split into number of closely spaced lines. This phenomenon is known as
   a) Stark effect
   b) Zeeman effect
   c) Raman effect
   d) Compton effect

3) Rotational spectroscopy is observed in ---------- molecules.
   a) Polar
   b) Non polar
   c) Homo atomic
   d) None of these

4) De Broglie's equation states the ----------
   a) Particle nature of light
   b) Wave nature of light
   c) Dual nature of light
   d) None of these

5) Which of the following examples of photochemical reaction?
   a) Photosynthesis
   b) Formation of ammonia
   c) Formation of NaOH
   d) None of these

6) The reaction caused by heat and absence of light is called as ---------- reactions.
   a) Photochemical
   b) Reversible
   c) Irreversible
   d) Dark

7) Dipole moment of benzene is ---------- Debye.
   a) Zero
   b) One
   c) Two
   d) Three

8) The substance which rotates plane polarised light is called ----------
   a) Optically active
   b) Optically in active
   c) Both a & b
   d) None of these

9) The size of nano particles lies in between ---------- nanometer.
   a) 100 to 1000
   b) 0.1 to 10
   c) 1 to 100
   d) 0.01 to 1

10) Leaves of Germanium plants are used in synthesis of ------- nano-particles.
   a) Cu
   b) Au
   c) Zn
   d) Ag

Total No. of Printed Pages: 03

SUBJECT CODE NO: - Y-2004
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. T.Y (SEM-V)
Examination March / April - 2023
Chemistry Paper -XIV(Organic Chemistry)

[Time: 1:30 Hours] **[Max. Marks:50]**

Please check whether you have got the right question paper.

N. B 1) All questions are compulsory.

Q1 a. How many sets of equivalent protons are present in ^{1}H NMR spectrum of the following compounds? 10
- i. Acetone
- ii. Ethanol
- iii. Toluene
- iv. Acetaldehyde
- v. Ethyl acetate

Q1 b. Explain the following terms: 10
- i. Cleansing action of Soaps.
- ii. Claisen ester condensation.

OR

Q1 a. How will you convert diethyl malonate into following compounds? 10
- i. Crotonic acid
- ii. Barbitunic acid
- iii. Succinic acid

10

Q1 b. Explain any two relations of
- i. Grignard reagents
- ii. Organozinc compounds

Q2 a. What is the action of Methylithium on the following compounds? Explain with reactions. 10
- i. Dry ice
- ii. Acetaldelnyde
- iii. Acetonitrile
- iv. Ethylene oxide

Q2 b. Explain the following terms: 10
- i. Saponification value
- ii. Chemical shift
- iii. Iodine value
- iv. Coupling constant

OR

Q2 Write note on any four of the following: - 20

i. Preparation of sodium alkyl sulfonate
ii. Retiomatsky relation
iii. Keto enol tautomenism
iv. Shielding and DE shielding
v. Acidity of alpha hydrogen in active methylene compounds?

Q3 Identify correct answer: - 10

1. The nature of carbon. Metal bond in organometallic compounds can be best describe as _____
   a. 100% covalent
   b. 100 % ionic
   c. Dative
   d. Covalent bond having partial ionic character.

2. Organozinc compounds react with acid chlorides to produce _____
   a. Aldehydes b. ketones c. Esters d. carboxylic acids.

3. Which of the following solvents can be used for reactions involving Grignard reagent?
   a. Method b. Ethanol c. THF d. Isopropyl alcohol

4. Oils and facts are _____ glycerides of long chain carboxylic acids.
   a. Mono b. di c. tri d. tetra

5. Alkaline hydrolysis of ails of fats is called _____
   a. Fermentation b. diazotization c. Saponification d. none of these

6. Oils and facts on prolonged storage produce an offensive odour. This is called _____
   a. Rancidity b. saponification c. R-M value d Acid value

7. The distance between adjacent peaks in 1 HNMR signal is called _____.
   a. Chemical shift
   b. Coupling constant
   c. Shielding effect
   d. DE shielding effect

8. Tertiary alcohol can be obtained by the reaction of ____ with Grignard reagent followed by Hydrolysis?
   a. Aldehydes b. ketone c. acids d. none of these

9. The extent of unsaturation in an oil of fat is expressed in terms of its ____
   a. Acid number
   b. Saponification number
   c. Iodine number
   d. None of there

10. Which of the following compound is used as internal standard in ‘H NMR’?
    a. Trimethyl silane
    b. Tetramethyl silane
    c. Trimethylsilyl chloride
    d. All of these

Total No. of Printed Pages: 02

SUBJECT CODE NO: - Y-2009
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. T.Y (Sem-VI)
Examination March / April - 2023
Chemistry Paper –XVI (Inorganic Chemistry)

[Time: 1:30 Hours] **[Max. Marks: 50]**

Please check whether you have got the right question paper.

N. B 1) Attempt all questions.
2) Draw neat labelled diagram whenever necessary.

Q1 a) Give any two methods of preparation, properties and uses of Organoaluminium compounds. 10

b) Give the limitations of VBT. 10

OR

c) Discuss the splitting of d-orbitals in tetrahedral complexes. 10

d) Explain metalloporphyrins with special reference to haemoglobin. 10

Q2 a) Explain electronic spectra of $[Ti(H_2O)_6]^{3+}$ complex ion. 10

b) Discuss the following. 10

i) Spin Selection rule

ii) Ascending paper chromatography

OR

c) Write short notes (Any Four) 20

1) Biological role of calcium
2) Rf Value
3) Assumptions of CFT
4) Orgel diagram of d^9 configuration
5) Nature of bonding in metal carbonyls
6) Shape of d-orbitals

Q3 Multiple Choice questions. 10

1) Which of the following ligand causes maximum crystal field splitting?

a) NH_3 b) F^- c) CO d) H_2O

2) CFSE value depends on

a) nature of ligands b) charge on the metal ion

c) Geometry of complex d) Whether the metal ion from 3d, 4d and 5d series

3) The spin allowed transition are

a) $3_{T1g} \rightarrow 3_{T2g}$ b) $4_{T1g} \rightarrow 4_{A2g}$

c) $4_{T2g} \rightarrow 4_{A2g}$ d) All these

4) For Laporte allowed transition

a) $\Delta l = 0$ b) $\Delta s = 0$ c) $\Delta l = \pm 1$ d) None

5) Which of the following is an organometallic compound

a) $Ti(C_2H_4)_4$ b) $Ti(OC_2H_5)$

c) $Ti(OCOCH_3)_4$ d) $Ti(OC_6H_5)_4$

6) CH_3MgBr is organometallic in nature due to the presence of

a) Mg-Br bond b) C-Mg bond

c) C-Br bond d) C-H bond

7) Which of the following has Magnesium

a) Chlorophyll b) Haemoglobin c) Vit.B-12 d) Vit.C

8) Nitrogenase catalyzes one of the following conversion

a) Dinitrogen to ammonia b) Nitrite to Nitrate

c) Ammonia to dinitrogen d) All these

9) In TLC, Stationary phase is

a) Solid b) liquid c) gas d) plasma

10) Mobile phase can be

a) Gas or liquid b) solid or liquid c) only solid d) only gas

Total No. of Printed Pages: 2

SUBJECT CODE NO: - Y-2010
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. T.Y (Sem-VI)
Examination March / April - 2023
Chemistry Paper -XVII (Organic Chemistry)

[Time: 1:30 Hours] **[Max. Marks: 50]**

Please check whether you have got the right question paper.

N. B i) Attempt all questions
ii) Figures to the right indicate full marks.

Q1 A) Give the preparation of Quinoline by skraup method and furan from music acid. 10

B) Give interconversions of 10

i) Fructose to Glucose

ii) Glucose to Mannose

OR

A) What is mutarotation & Explain mutarotation of glucose? 10

B) i) Give comparison of basicity of pyrrole, piper dine & pyridine 05

ii) Explain with mechanism the nitration of pyrrole 05

Q2 A)

i) Explain colour and constitution of dyes 06

ii) Give synthesis of chloromycetien 04

B) What is polymerisation? Give the synthesis and uses of Nylon 6 & Neoprene 10

OR

Write short note on (Any four) 20

a) Molecular orbital picture of thiophene

b) Congo red

c) properties of an ideal drug

d) Synthesis of sulphaguanidine

e) Cellulose

f) Amination of pyridine

Q3 Multiple choice questions 10

1. How many no. of resonating structure stabilises a pyridine molecule

   a) 4 b) 5 c) 6 d)7

2. Quinoline is used as a _____.

   a) antipyretic b) anti-inflammatory c) analgesic d) antiseptic

3. Which of the following is not auxochrome

   a) -OH b) –OR c) $–NH_2$ d) -COOH

4. Natural rubber is a_____ addition polymer of isoprene unit

   a) 1-2 b) 1-4 c) 1-3 d) 1-5

5. Maltose is a disaccharide of_____.

   a) Glucose & galactose b) Glucose f glucose

   c) Glucose & lactose d) fructose & lactose

6. Which of the following solvent is a heterocyclic compound?

   a) DMSO b) Diglyme c) DMF d) THE

7. The monomer of polyacrylonitrile is

   a) vinyl cyanide b) vinyl chloride c) vinyl alcohol d) None of these

8. Which of the following is also known as invert sugar?

   a) sucrose b) fructose c) Dextrose d) glucose

9. Which of the following undergo the Diels - Alder reaction

   a) furan b) pyrrole c) twophene d) none of these

10. Sulphaguanidine is used for

    a) dysentery b) urinary infection c) antiseptic d) antipyretic