Total No. of Printed Pages:2

SUBJECT CODE NO: N-2143
FACULTY OF SCIENCE
B.Sc. F.Y (Sem-II) Examination Nov/Dec 2017
Chemistry Paper-IV(Physical 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) Illustrate your answer with suitable labeled diagram.

Q.1 Deduce in detail the gas laws. 20

OR

Explain X-ray diffraction by crystals. Derive Bragg's equation.

Q.2 Derive rate equation of second order reaction (a=b) and its half-life. 20

OR

Write short notes on any four.

a) Calculate the difference between two points lying on the straight line
   i) (8, 4) and (6, 5)
   ii) (2, -1) and (6, 2)
b) Using logarithms solve
   i) 740*120
   ii) 1540÷ 130
c) Explain classification of liquid crystals
d) Write the difference between liquids and gases
e) Write preparation and properties of gels
f) Define colloids and give its classification.

Q.3 Multiple choice questions. 10

1) The chang of solid to gas is
   a) Freezing
   b) Sublimation
   c) Deposition
   d) Fusion

2) Which must be the lowest temperature?
   a) 0^0C
   b) 100^0C
   c) 273^0C
   d) -273^0C

3) In Arrhenius plot, intercept is equal to
   a) $-\frac{Ea}{R}$
   b) In AB
   c) Ik
   d) Log A

4) A plot of log (a-x) Vs time to is straight line, this indicates that the reaction is of
   a) First order
   b) Second order
   c) Zero order
   d) Third order

5) Rate constant of zeroth order can be expressed as
   a) Mole lit^{-1} sec^{-1}
   b) Mole sec^{-1}
   c) $Time^{-1}$
   d) All

6) If surface area is increased, it increases
   a) M.P
   b) Evaporation
   c) B.P
   d) All of the above

7) X-Ray spectrometer method is developed by
   a) De Broglie
   b) Bragg
   c) Planck
   d) None of the above

8) Fe $(OH)_3$ in water is example of
   a) Negative colloids
   b) Molecular colloids
   c) Positive colloids
   d) All of the above

9) Log 260
   a) 2.3150
   b) 2.4150
   c) 2.5150
   d) 2.6150

10) What is the slope and intercept of the line $3y - 9x + 6 = 0$
   a) (4, 5)
   b) (2, -3)
   c) (-1, -3)
   d) (3, -2)

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SUBJECT CODE NO:- N-2144
FACULTY OF SCIENCE
B.Sc. F.Y (Sem-II) Examination Nov/Dec 2017
Chemistry Paper- V Inorganic 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. All questions carry equal marks.
iii. Illustrate your answer with suitable labeled diagram.

Q.1 a) Discuss the structure and bonding in $Xe F_4$. 10

OR

b) Explain the formation of water molecule with the help of VSEPR theory. 10

Q.2 a) What is Hybridization? What are the different types of hybridization? 10

OR

b) Explain Sp hybridization with suitable example. 10

Q.3 a) What is radioactivity? Describe the properties of β and γ particles. 10

OR

b) Explain :
a) Formation of SF_6 molecule 05
b) Role of phenolphthalein in acid-base titration. 05

Q.4 Write short notes on any two of the following. 10
a) Calibration of burette
b) Hydrogen bonding
c) Bonding and antibonding molecular orbital
d) Packing fraction

Q.5 Attempt the following. 10

1. All the Noble gases are present in atmosphere except ---------.
   a) Helium
   b) Xenon
   c) Radon
   d) Neon

2. XeF_2 has --------- geometry.
   a) Trigonal bipyramidal
   b) Linear
   c) Trigonal
   d) Square planar

3. The bond which is formed by transfer of electron from one atom to other is called -------- bond.
   a) Covalent
   b) Ionic
   c) Coordinate
   d) Hydrogen

4. VSEPR theory was proposed by ----------.
   a) Heitler & London
   b) Panling& Slater
   c) Gillespie &Nyholm
   d) Sidgwick & Powell

5. Coordinate bond is also called ---------- bond.
   a) Ionic
   b) Dative
   c) Metallic
   d) Covalent

6. Bond order of N_2 is ----------.
   a) Zero
   b) One
   c) Two
   d) Three

7. The shape of ClF_3 molecule is ----------.
   a) Triangular planar
   b) T-shaped
   c) V-shape
   d) See-saw

8. Magnetic behavior of Li_2 is ----------.
   a) Diamagnetic
   b) Paramagnetic
   c) Ferromagnetic
   d) Antiferromagnetic

9. ${}_1^3H$ Isotope of hydrogen contains ----------.
   a) One proton
   b) One neutron
   c) One proton & one neutron
   d) One proton & two neutron

10. EDTA is a ---------- agent.
   a) Oxidizing
   b) Reducing
   c) Complexing
   d) Neutralizing

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SUBJECT CODE NO:- N-2149
FACULTY OF SCIENCE
B.Sc. S.Y (Sem-IV) Examination Nov/Dec 2017
Chemistry Paper-X (Inorganic Chemistry)

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

Please check whether you have got the right question paper.

N.B i) All questions are compulsory.

Q.1 a) What are 'd' block elements? Discuss the general characteristic features of 'd' block elements. 10

b) Describe the postulates of Werner's theory of co-ordination compounds. 10

OR

c) Give the electronic configuration of actinide series elements. 10

d) Discuss the following reactions in Liq. NH_3. 10

i) Acid-Base reaction

ii) Ammonolysis

Q.2 a) Describe ion exchange method for the separation of lanthanides. 10

b) Describe the concept of Acid-Base according to Lewis theory and give the types of Lewis acid. 10

OR

c) Write a short note on. (any four) 20

1) Oxidation state of first transition series elements
2) EAN Rule
3) Consequences of lanthanide contraction
4) Separation of Am from uranium
5) Conjugate acid-base pair
6) Precipitation reaction in Liq SO_2.

Q.3 Multiple choice questions. 10

1) Manganese belongs to
   a) 's' block
   b) 'p' block
   c) 'd' block
   d) 'f' block
2) Donor atoms in EDTA are
   a) Two N and two O
   b) Two N and four O
   c) Four N and two O
   d) Three N and three O
3) Lanthanide contraction is observed in
   a) Xe
   b) Zn
   c) Cd
   d) Gd

4) Transuranic elements begins with
   a) NP
   b) Cm
   c) Pu
   d) U

5) Which of the following is polar solvent
   a) CCl_4
   b) $C_6 H_6$
   c) H_2O
   d) None of these

6) According to Lowry-Bronsted theory, which one is an acid
   a) H_3O^+
   b) $SO4^{--}$
   c) OH^-
   d) CI^-

7) Which of the following transition metal shows variable valency
   a) Fe
   b) Sc
   c) Y
   d) Ac

8) The oxidation number of cobalt in $K[CO(CN)_4]$ is
   a) +1
   b) -1
   c) -3
   d) +3

9) The elements in which 4f orbitals are progressively filled are called as
   a) Actinides
   b) Halogens
   c) Transition elements
   d) Lanthanides

10) Which of the following is not Lewis acid
   a) BF_3
   b) $AlCl_3$
   c) $BeCl_2$
   d) NH_3

Total No. of Printed Pages:3

SUBJECT CODE NO:- N-2150
FACULTY OF SCIENCE
B.Sc. S.Y (Sem-IV) Examination Nov/Dec 2017
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
i. Attempt all questions.
ii. Figure to the right indicates full marks.
iii. Use of non-programmable calculator is allowed.

Q.1 a) What is phase-rule? Explain different terms involved in it. 10

b) What is transport-number? How it is determined by Hittorf's method. 10

OR

a) What is buffer solution? Explain the mechanism of acidic and basic buffer. 10

b) Explain effect of dilution on specific and equivalent conductance. 10
The resistance of 0.25 N salt solution is found to be 100 ohms between two electrodes which are 2.0cm apart and having cross section area 4 cm^2. Calculate equivalent conductance.

Q.2 a) Discuss phenol-water and triethyl-amine-water system. 10

b) What is electrochemical series? Give its significance. 10

OR

Write short notes on. (any four) 20
a) Freezing mixtures
b) Triple point
c) Application of Kohlrausch's law
d) Ostwald's dilution law
e) Standard hydrogen electrode
f) Dry corrosion

Q.3 Choose and write the correct answer of the following. 10

1) The maximum degrees of freedom for two component system is ----------.
1) 1
2) 2
3) 3
4) 4

2) The no. of phases in mixture of water and ethanol are ---------.
   a) 1
   b) 2
   c) Zero
   d) None

3) The degree of freedom of triple point is ----------.
   a) Zero
   b) 3
   c) 2
   d) 1

4) The unit of cell constant is ----------.
   a) Cm
   b) Cm^{-1}
   c) Cm^{2}
   d) Cm^{-2}

5) What is effect of dilution on equivalent conductance?
   a) Decreases
   b) Increases
   c) Both a and b
   d) Constant

6) Transport number of sliver ion in silver nitrate solution is 0.32. the transport number of nitrate ion will be ----------.
   a) 1
   b) 0.32
   c) 0.68
   d) Zero

7) The pressure of hydrogen gas in standard hydrogen electrode is -------- atmosphere.
   a) Zero
   b) 1
   c) 2
   d) 3

8) Cell which converts electrical energy into chemical energy is ----------.
   a) Electro-chemical cell
   b) Electrolytic cell
   c) Both a and b
   d) None of these above

9) The pH of solution is 9.2; the solution is ---------.
   a) Acidic
   b) Basic
   c) Both a and b
   d) Neutral

10) The critical pressure of water is --------- atmosphere.
   a) 374
   b) 218
   c) 100
   d) Zero

Total No. of Printed Pages:3

SUBJECT CODE NO:- N-2001
FACULTY OF SCIENCE
B.Sc. T.Y (Sem-V) Examination Nov/Dec 2017
Chemistry Paper –XIII
(Physical 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.

Q.1 A) Give the postulates of Bohr's theory of hydrogen atom. Give its defects. 10

B) What is rigid rotator? Derive an equation for moment of inertia of diatomic rigid rotator. Calculate reduced mass and moment of inertia of NaCl molecule if its bond length is $2.36A^0$. Atomic masses of Cl = 35.5 and Na=23.0 gm mol $^{-1}$. N=6.023 x 10^{23}. 10

OR

A) Draw Jablanski diagram and explain non radiative transitions. When the substance was exposed to light 0.003 moles of it reacted in 25 minutes. Calculate quantum yield if it absorbs 2.1 X 10^4 photons per second in the same time. 10

B) What is optical activity? How it is measured by polarimeter. 10

Q.2 A) Discuss rotational energy levels of rigid diatomic molecule with the help of suitable diagram. Explain how it helps in determining bond length of a diatomic molecule. 10

B) State and explain photo electric effect. Calculate de Broglie wavelength of a particle moving with velocity 2.18 X10^8 cms^{-1}.(Mass of particle, m=9.109 X 10^{-28} gm, h=6.62 X10^{-27} ergsec) 10

OR

Write short notes on any four of the following :- 20

a) Heisenberg uncertainty principle
b) Basic components of different spectrometers.
c) Quantum yield
d) Application of dipole moment in structure determination
e) High energy ball milling
f) Synthesis of nanomaterial's using plant extract.

Q.3 Select and write correct answer of the following multiple choice questions. 10

1) De Broglie's Wavelength of a particle is given as
   a) $\lambda = \frac{h}{v}$
   b) $\lambda = \frac{h}{mv}$
   c) $\lambda = \frac{h}{m}$
   d) $\lambda = \frac{h}{2\pi m}$

2) Angular momentum of an electron is integral multiple of
   a) $\frac{h}{2\pi}$
   b) $\frac{2\pi}{h}$
   c) $2\pi h$
   d) $\frac{h}{\pi}$

3) Which of the following shows rotational spectra…….
   a) Cl_2
   b) H_2
   c) HCl
   d) CO_2

4) The distance between two successive spectral lines in rotational spectra is
   a) B
   b) 2B
   c) 3B
   d) 4B

5) The selection rule for rigid rotator is
   a) $\Delta J = \pm 1$
   b) $\Delta J = \pm 2$
   c) $\Delta J = \pm 3$
   d) $\Delta J = 0$

6) Fluorescence occurs when transition is
   a) Triplet – Triplet
   b) Singlet – singlet
   c) Triplet – Singlet
   d) All of these

7) What will be quantum yield when one mole of substance reacts by absorbing 6.022×10^{23} photons .
   a) 0.1
   b) 1
   c) 10
   d) Zero

8) Dipole moment of benzene molecule is
   a) Zero
   b) One
   c) Two
   d) Three

9) Substance which rotates plane polarized light in clockwise direction is ---------.
   a) Leavorotatory
   b) Dextro rotatory
   c) Racemic mixture
   d) All of these

10) 0.1 nanometer is equal to
   a) $10^{-9}m$
   b) $10^{-8}m$
   c) $10^{-10}m$
   d) $10^{-11}m$

Total No. of Printed Pages:3

SUBJECT CODE NO:-N-2002
FACULTY OF SCIENCE
B.Sc. T.Y (Sem-V) Examination Nov/Dec 2017
Chemistry Paper -XIV(Organic Chemistry)

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

Please check whether you have got the right question paper.

N.B i) All questions are compulsory.

Q.1 a) An organic compound having molecular formula $C_5H_{11}Cl$ gave the following $'H\ NMR$ data: δ 1.0 $(t, 3H)$ 1.5 $(s, 6H)$ and 1.8 $(q, 3H)$ deduce the structure of the compound. 10

b) How will you prepared primary, secondary and tertiary alcohol by using Grignard reagent 10

OR

a) A compound C_9H_{12}gave the following NMR data 10

δ 2.1 $(S, 9H)$

δ 7.0 $(S, 3H)$

Deduce the structure of the compound.

b) Explain the synthesis of diethyl malonate and comment on the acidic nature of methylene hydrogen. 10

Q.2 a) Starting from acetoacetic ester, how the following compounds can be prepared: 10

i) Butanone
ii) Acetyl acetone
iii) Isobutyric acid

b) What are detergents? How are they obtained? 10

OR

a) Write short note on (any four) 20

i) Shielding and deshielding
ii) Chemical shift
iii) Organolithium
iv) Claisen condensation with mechanism
v) Synthesis of 4-methyl uracil from acetoacetic ester.
vi) Animal fats.

Q.3 Choose the correct option for the following 10

1) Which of the following compound shows only one $'H\ NMR$ signal
   a) Neopentane
   b) Xylene
   c) Chlorobenzene
   d) Benzoic acid

2) Chemical shift of aldehydic proton is
   a) 3.7 to 4.1
   b) 2.00-2.6
   c) 9-10
   d) 3-4

3) How many π bonds are present in enol form of ethyl acetoacetate
   a) Two
   b) One
   c) Three
   d) Four

4) The saponification value of oils can be determine by means of its .
   a) Octane number
   b) Saponification value
   c) Acid value
   d) Iodine value

5) Which of the following is not organometallic compound.
   a) R_2Cd
   b) RMgx
   c) RLi
   d) RCOONa

6) Alkyl magnesium bromide react with water gives
   a) Alkene
   b) Alkane
   c) Alcohol
   d) Aldehyde

7) Diethyl malonate react with Urea gives.
   a) Butyric acid
   b) Isobutyric acid
   c) Carboxylic acid
   d) Barbituric acid

8) In $'H\ NMR$ ethanol shows ---------- signals
   a) One
   b) Two
   c) Three
   d) Four

9) Hard soaps are obtained by hydrolysis of oils or fats using.
   a) KOH
   b) NaOH
   c) HCl
   d) H_2SO_4

10) Ketonic hydrolysis of ethyl acetoacetate gives
   a) Acetone
   b) Cyclohexanone
   c) Alcohol
   d) Acetic acid

Total No. of Printed Pages:3

SUBJECT CODE NO:-N_2007
FACULTY OF SCIENCE
B.Sc. F.Y (Sem.-I) Examination Nov/Dec 2017
Chemistry Paper-I (Inorganic 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) Illustrate your answer with suitable labeled diagram.

Q.1 a) What are quantum numbers? Explain magnetic Quantum number and spin Quantum number. 10

b) What is electronegativity? Explain the trends in periodic table. 10

OR

c) What are S-block elements? Explain role of alkali metals in biological system. 10

d) What are interhalogen compounds? Explain in detail AX_3 and AX_5 type of interhalogen compound. 10

Q.2 a) State and explain Heisenberg's Uncertainty principle and Hund's rule of maximum Multiplicity. 10

b) Explain the hydrides and oxides of group IVA or 14^{th} Elements. 10

OR

Write short notes on any four of the following. 20

a) Postulates of Bohr's atomic theory.
b) Diagonal relationship of Be with Al.
c) Electronic Configuration of II A or alkaline earth metal.
d) Oxides of group V A or 15^{th} elements.
e) Hydrides of group 13 elements.
f) Ionization potential

Q.3 Attempt the following 10

1) Shape of d-orbital is
   a) Spherical
   b) Dumb bell
   c) Double dumb- bell
   d) None of these

2) Orientation of sub- orbitals represented by
   a) Azimuthal quantum number
   b) Principle quantum number
   c) Magnetic quantum number
   d) Spin quantum number

3) Electron affinity depends on ----------.
   a) Atomic size
   b) Nuclear charge
   c) Atomic number
   d) Atomic size and nuclear charge both.

4) The element's with highest electron affinity among halogen is
   a) F
   b) Cl
   c) Br
   d) I

5) Which of the following sets of atomic number belongs to that of alkali metals
   a) 19 and 03
   b) 2 and 12
   c) 9 and 7
   d) 12 and 20

6) Which of the following is most electronegative?
   a) Tin
   b) Lead
   c) Silicon
   d) Carbon

7) Which of the following element is present in chlorophyll.
   a) Ca
   b) Na
   c) Mg
   d) K

8) Elements with atomic number 11 belongs to which block.
   a) s
   b) p
   c) d
   d) f

9) Of the given alkali metal's below which is the smallest in size.
   a) Rb
   b) Cs
   c) K
   d) Na

10) Which of the following is interhalogen compound.
   a) NaCl
   b) HCl
   c) ICl_3
   d) KCl.

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SUBJECT CODE NO:- N-2008
FACULTY OF SCIENCE
B.Sc. F.Y (Sem-I) Examination Nov/Dec 2017
Chemistry Paper-II (Organic Chemistry)

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

Please check whether you have got the right question paper.

N.B i)Attempt all question
ii) Use blue or black pen only

Q.1 a) How product analysis and isotope effect helps in determination of mechanism of organic reaction? 10

b) Define structural isomerism. Give its classification. 10

OR

c) Discuss concept of resonance and charge transfer complexes. 10

d) Comment on structure of carbanion. Explain, why tertiary butyl carbanion is less stable than ethyl carbanion. 10

Q.2 A) i) Explain Nitration and sulphonation of alkenes. 05

ii) Explain polymerization of alkenes. 05

B) i)Explain molecular orbital picture of benzene 05

ii) Write a note on nuclear reactions of aryl halide. 05

OR

Write short notes on (<u>any four</u>) 20

a) Elimination reaction
b) D-L notation system
c) Decarboxylation of carboxylic acids
d) Peroxide effect
e) Aromaticity
f) Nucleophilic aromatic substitution reaction of aryl halide with mechanism.

Q.3 Choose and write the correct answer of following 10

1 Inter molecular H-bonding _____ water solubility of organic compounds

a) Decreases
b) Increases
c) Does not affect
d) First increase then decreases

2 Electron availability within a molecule does not depend upon which of the following effect.

a) Inductive
b) Resonance
c) Peroxide
d) Hyper conjugation

3 The order of stability of carbanion is

a) $1^0>2^0>3^0$
b) $3^0>2^0>1^0$
c) $2^0>3^0>1^0$
d) $1^0>3^0>2^0$

4 Dextrorotatory enantiomer rotates the PPL in _____ direction.

a) Clockwise
b) Anticlockwise
c) Both a & b
d) None of above

5 Chloroform has _____ axis of symmetry.

a) C_2
b) C_3
c) C_4
d) C_5

6 Alkyl groups are formed by replacement of _____ H-atom of corresponding alkane.

a) Four
b) Three
c) Two
d) One

7 Alkenes are soluble in _____

a) Water
b) Alcohol
c) Both a & b
d) None of above

8 $CH_3 - CH_2 - Cl \xrightarrow{alc.KOH} CH_2 = CH_2 + kcl + H_2O$ is _____ reaction

a) 1,1 Elimination
b) 1,1 addition
c) 1,2 Elimination
d) 1,2 addition

9 Which compound is used as fire extinguisher under the name of pyrene

a) Benzene
b) CH_3OH
c) $CHCl_3$
d) CCl_4

10 The aromatic compounds have _____ π- electron system.

a) 4n
b) 4n+1
c) 4n+2
d) 4n+3

Total No. of Printed Pages:4

SUBJECT CODE NO: N_2013
FACULTY OF SCIENCE
B.Sc. S.Y (Sem-III) Examination Nov/Dec 2017
Chemistry Paper-VII (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) Use blue or black pen only.

Q.1 a) Explain following reactions of phenol with their mechanism. 10

i) Intermolecular fries rearrangement.

ii) Claisen rearrangement.

b) Explain knoevenagel condensation with mechanism. 10

OR

c) How will you prepare. 10

i) Ethanol from acetaldehyde.

ii) Propan- 2-0l from Propanone.

iii) Ethanol from ethanoic acid.

iv) Ethanol from ethyl acetate.

d) Give chemical reactions of tartaric acid. 10

Q.2 A) How will you prepare primary amines by 10

i) Reduction of nitro compounds

ii) Reduction of nitriles.

iii) Reductive amination of aldehydes and ketones.

B) Explain chemical reactions of nitroalkanes 10

OR

C) Write short notes on (any four) 20

i) Use of acetal as protecting group

ii) HVZ reaction

iii) Baeyer – villiger oxidation

iv) Hoffmann bromamide reaction for preparation of amine

v) Reaction of amines with nitrous acid

vi) Basic nature of amines

Q.3 Choose and write the correct answer of the following questions 10

(answer all questions)

1) Which of the following is primary alcohol?

a) Butan - 1 - o1

b) Butan -2 - o1

c) Propan -2 -o1

d) Isopropyl alcohol

2) Phenol on carboxylation gives.

a) Benzoic acid.

b) Salicylic acid

c) Formic acid.

d) Acetic acid.

3) Which of the following compound does not contain –OH group?

a) Phenol

b) Carboxylic acid.

c) Aldehyde

d) Alcohol.

4) Sodium salts of carboxylic acids on heating with sodalime give.

a) Phenols

b) Alcohols

c) Ketones.

d) Alkanes.

5) Alkyl halides on heating with aqueous ethanolic solution of silver nitrite give.
   a) Amines
   b) Phenols
   c) Alcohols
   d) Nitro alkanes.

6) Aldehydes on oxidation with chromium trioxide and aqueous sulphuric acid give
   a) Alcohol
   b) Phenol
   c) Carboxylic acid
   d) None of these.

7) Acetic acid reacts with methyl alcohol in the presence of an acid catalyst to give
   a) Methyl formate
   b) Methyl acetate
   c) Ethyl formate
   d) Ethyl acetate

8) Aniline reacts with bromine to form.
   a) 2,4,6 – tribromo aniline.
   b) 2,4,5 – tribromo aniline.
   c) 2,4 – dibromo aniline
   d) 2, 6 –dibromo aniline

9) Ethyl acetate on hydrolysis gives
   a) Ethyl alcohol and acetic acid
   b) Ethylene and ethyl alcohol
   c) Acetaldehyde and acetic acid
   d) Acetaldehyde and ethyl alcohol

10) The central nitrogen atom in amines is

a) SP^2 hybridised

b) SP^3 hybridised

c) SP hybridised

d) $SP^3 d^2$ hybridised.

Total No. of Printed Pages:3

SUBJECT CODE NO:- N_2014
FACULTY OF SCIENCE
B.Sc. S.Y (Sem-III) Examination Nov/Dec 2017
Chemistry Paper-VIII (Physical 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) Illustrate your answer with suitable diagram.

Q.1 a) State and explain Hess's law of heat summation. Give its applications. 10

b) What is Gibb's free energy? Give its variation with respect to temperature and pressure. 10

OR

c) Define the terms isothermal, adiabatic, reversible and irreversible process with suitable example. 10

d) Give the various statement of second law of thermodynamics. Calculate the efficiency and amount of heat supplied by Carnot cycle operating between temperature 310 k to 400 k, if maximum work obtained is 675 joules. 10

Q.2 a) State and explain Le-Chatelier's principle. What is the effect of change of concentration, pressure and temperature 10

b) Explain how entropy can be used as criteria of spontaneity and equilibrium 10

OR

Write short notes on any Four of the following 20

a) Intensive and extensive properties.
b) First law of thermodynamics.
c) Carnot theorem
d) Entropy and its physical significance.
e) Law of mass action.
f) Reaction isotherm.

Q.3 Multiple choice questions. 10

1) The enthalpy of a system is defined by the relation.
   a) H = E + PV
   b) H = E- PV
   c) E = H + PV
   d) E = PV – H

2) Example of intensive property is.
   a) Surface tension
   b) Density
   c) Viscosity
   d) All of these.

3) A part of the universe which is under thermodynamic study is called
   a) Surrounding
   b) System
   c) Process
   d) None of these.

4) 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
   c) Molar heat capacity
   d) Molar capacity.

5) Entropy is a measure of ---------- of the molecules of the system.
   a) randomness
   b) Concentration
   c) Velocity
   d) Zig – Zag motion

6) A process is in the equilibrium state when
   a) $\Delta G > 0$
   b) $\Delta G < 0$
   c) $\Delta G = 0$
   d) None of these

7) In a process $\Delta H = 100KJ$ and $\Delta S = 100\ JK^{-1}$ at 400K , the value of ΔG will be
   a) Zero
   b) 60 KJ
   c) 100 KJ
   d) 200 KJ

8) Which is the correct unit for entropy
   a) KJ mol
   b) JK^{-1} mol
   c) $JK^{-1}\ mol^{-1}$
   d) None of these.

9) Equilibrium reactions are characterized by
   a) The presence of both reactants and product in a definite proportion.
   b) Going to completion
   c) Being non- spontaneous
   d) All of these.

10) $\frac{dp}{dT} = \frac{\Delta H}{T(V_2 - V_1)}$ is a
   a) Gibb's equation
   b) Vant Hoff isotherm
   c) Vant Hoff isochore
   d) Clapeyron equation

Total No. of Printed Pages:2

SUBJECT CODE NO: N-2048
FACULTY OF SCIENCE
B.Sc. T.Y (Sem-VI) Examination Nov/Dec 2017
Chemistry Paper –XVI (Inorganic 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) Illustrate your answer with suitable diagram.

Q.1 (a) Discuss the splitting of d-orbitals in octahedral metal complexes. 10
(b) Describe the nature of bonding in metal carbonyls. 10

OR

(c) Explain the electronic spectrum of $[Ti(H_2O)_6]^{3+}$ Complex ion. 10
(d) Explain i) Spectrochemical series 10
ii) $\Delta_t = \frac{4}{9}\ \Delta_o$

Q.2 (a) Discuss the principle and technique of paper chromatography. 10
(b) What are Mettalloporphyrins? Explain the role of hemoglobin in biosystem. 10

OR

(c) Write short notes on any four of the following 20
1) Limitations of valence bond theory.
2) Spin selection rule
3) Role of alkali metals in biosystem.
4) Rf value.
5) Metal ethyllinic complexes.
6) Classification of organometallic compounds.

Q.3 Multiple Choice questions. 10

1) The number of unpaired electrons in d^5 system.
a) 5 b) 4
c) 3 d) 0

2) The energy of t2g orbitals in octahedral complex decreases by
a) -6Dq b) -4Dq
c) +4Dq d) +6Dq

3) The complexes formed by strong Field ligands are called as
   a) Low spin b) high Spin

   c) No spin d) All of these

4) The ground term symbol for d^9 system is
   a) 6S b) 2D
   c) 3F d) 4F

5) Spin multiplicity is equal to
   a) S+1 b) S-1

   c) 2S+1 d) 2S-1

6) The IUPAC name of the C_2H_5MgBr is

   a) ethyl magnesium bromide b) bromo magnesium ethyl

   c) magnesium ethyl bromide d) none

7) Symmetrical simple organometallic compound is
   a) $CH_3MgC_2H_5$ b) $C_2H_5SnC_3H_8$

   c) $(CH3)_2^{zn}$ d) All of these

8) The metal present in chlorophyll is
   a) Mg b) Mn
   c) Fe d) Zn

9) In the paper chromatography, mobile phase is
   a) Solid b) Liquid
   c) gas d) All of these

10) Nitrogen fixation is carried out by bacteria
   a) E coil b) Rhizobium
   c) pleurococcus pneumonia d) None of these

Total No. of Printed Pages:02

SUBJECT CODE NO:- N-2049
FACULTY OF SCIENCE
B.Sc. T.Y (Sem-VI) Examination Nov/Dec 2017
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

Q.1 A) What are carbohydrates? Give the classification of carbohydrates with example. 10

B) What are Heterocyclic compounds? Explain with mechanism, the nitration & sulphonation of pyrrole. 10

OR

A) Give the inter conversion of glucose and fructose. 10

B) Give the synthesis of Quinoline by Skraup's method and Indole by fischer indole method. 10

Q.2 A) i) What are drugs? Give the properties of an ideal drug. 06

ii)Give the synthesis of :- 06
a)Phenacetin b)sulphaguanidine

B) What are polymers? Give the synthesis of Polyvinyl acetate and polyacrylonitrile 08

OR

Write short note on (any four) 20

a) Molecular orbital picture of Thiophene

b) Compare the basicity of pyridine, piperidine and pyrrole.

c) Cellulose

d) Constitution of dyes

e) Synthesis of Alizarin

f) Synthesis of congo red

Q.3 Multiple Choice Questions. 10

1.Maltose is an example of ----------

a)monosaccharides b)Disaccharides

c)Trisaccharides d)Polysaccharides

2.Number of asymmetric carbon atoms in glucose is ----------

a)1 b)2

c)4 d)6

3.Pyridine reacts with HCL to form----------

a)Pyridinium chloride b)3 chloropyridine

c)2 chloropyridine d)All of these

4. Furan reacts with ammonia in the presence of alumina at 400^0 C to form----------

a)Furoic acid b)Pyrrole

c)Furfural d)None of these

5. The product of Bischler- Napirlasky synthesis is--------

a)Pyridine b)Pyrrole

c)Quinoline d)Isoquinoline

6. Condensation Polymerisation of hexamethylene diamine and adipic acid produces--------

a)Nylon-6 b)Terylene

c)Nylon-66 d)All of these

7.Natural rubber is a polymer of ---------

a)Isobutylene b)chloroprene

c)Isoprene d)vinyl chloride

8.Which dye is used as medicine---------

a)crystal violet b)congo red

c)methyl orange d)Alizarin

9.Which drug is used as an antiseptic----------

a)Paracetamol b)sulphaguanidine

c)Phenacetin d)None of these

10.Which of the following is not a chromophore----------

a)$-N=N-$ b)$-NO$

c)$-NO_2$ d)$-NH_2$

Total No. of Printed Pages:2

SUBJECT CODE NO: N-2143
FACULTY OF SCIENCE
B.Sc. F.Y (Sem-II) Examination Nov/Dec 2017
Chemistry Paper-IV(Physical 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) Illustrate your answer with suitable labeled diagram.

Q.1 Deduce in detail the gas laws. 20

OR

Explain X-ray diffraction by crystals. Derive Bragg's equation.

Q.2 Derive rate equation of second order reaction (a=b) and its half-life. 20

OR

Write short notes on any four.

a) Calculate the difference between two points lying on the straight line
   i) (8, 4) and (6, 5)
   ii) (2, -1) and (6, 2)
b) Using logarithms solve
   i) 740*120
   ii) 1540÷ 130
c) Explain classification of liquid crystals
d) Write the difference between liquids and gases
e) Write preparation and properties of gels
f) Define colloids and give its classification.

Q.3 Multiple choice questions. 10

1) The chang of solid to gas is
   a) Freezing
   b) Sublimation
   c) Deposition
   d) Fusion

2) Which must be the lowest temperature?
   a) 0^0C
   b) 100^0C
   c) 273^0C
   d) -273^0C

3) In Arrhenius plot, intercept is equal to
   a) $-\frac{Ea}{R}$
   b) In AB
   c) Ik
   d) Log A

4) A plot of log (a-x) Vs time to is straight line, this indicates that the reaction is of
   a) First order
   b) Second order
   c) Zero order
   d) Third order

5) Rate constant of zeroth order can be expressed as
   a) Mole lit^{-1} sec^{-1}
   b) Mole sec^{-1}
   c) $Time^{-1}$
   d) All

6) If surface area is increased, it increases
   a) M.P
   b) Evaporation
   c) B.P
   d) All of the above

7) X-Ray spectrometer method is developed by
   a) De Broglie
   b) Bragg
   c) Planck
   d) None of the above

8) Fe $(OH)_3$ in water is example of
   a) Negative colloids
   b) Molecular colloids
   c) Positive colloids
   d) All of the above

9) Log 260
   a) 2.3150
   b) 2.4150
   c) 2.5150
   d) 2.6150

10) What is the slope and intercept of the line $3y - 9x + 6 = 0$
   a) (4, 5)
   b) (2, -3)
   c) (-1, -3)
   d) (3, -2)

Total No. of Printed Pages:3

SUBJECT CODE NO:- N-2144
FACULTY OF SCIENCE
B.Sc. F.Y (Sem-II) Examination Nov/Dec 2017
Chemistry Paper- V Inorganic 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. All questions carry equal marks.
iii. Illustrate your answer with suitable labeled diagram.

Q.1 a) Discuss the structure and bonding in $Xe F_4$. 10

OR

b) Explain the formation of water molecule with the help of VSEPR theory. 10

Q.2 a) What is Hybridization? What are the different types of hybridization? 10

OR

b) Explain Sp hybridization with suitable example. 10

Q.3 a) What is radioactivity? Describe the properties of β and γ particles. 10

OR

b) Explain :
a) Formation of SF_6 molecule 05
b) Role of phenolphthalein in acid-base titration. 05

Q.4 Write short notes on any two of the following. 10
a) Calibration of burette
b) Hydrogen bonding
c) Bonding and antibonding molecular orbital
d) Packing fraction

Q.5 Attempt the following. 10

1. All the Noble gases are present in atmosphere except ---------.
   a) Helium
   b) Xenon
   c) Radon
   d) Neon

2. XeF_2 has --------- geometry.
   a) Trigonal bipyramidal
   b) Linear
   c) Trigonal
   d) Square planar

3. The bond which is formed by transfer of electron from one atom to other is called -------- bond.
   a) Covalent
   b) Ionic
   c) Coordinate
   d) Hydrogen

4. VSEPR theory was proposed by ----------.
   a) Heitler & London
   b) Panling& Slater
   c) Gillespie &Nyholm
   d) Sidgwick & Powell

5. Coordinate bond is also called ---------- bond.
   a) Ionic
   b) Dative
   c) Metallic
   d) Covalent

6. Bond order of N_2 is ----------.
   a) Zero
   b) One
   c) Two
   d) Three

7. The shape of ClF_3 molecule is ----------.
   a) Triangular planar
   b) T-shaped
   c) V-shape
   d) See-saw

8. Magnetic behavior of Li_2 is ----------.
   a) Diamagnetic
   b) Paramagnetic
   c) Ferromagnetic
   d) Antiferromagnetic

9. ${}_1^3H$ Isotope of hydrogen contains ----------.
   a) One proton
   b) One neutron
   c) One proton & one neutron
   d) One proton & two neutron

10. EDTA is a ---------- agent.
   a) Oxidizing
   b) Reducing
   c) Complexing
   d) Neutralizing

Total No. of Printed Pages:2

SUBJECT CODE NO:- N-2149
FACULTY OF SCIENCE
B.Sc. S.Y (Sem-IV) Examination Nov/Dec 2017
Chemistry Paper-X (Inorganic Chemistry)

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

Please check whether you have got the right question paper.

N.B i) All questions are compulsory.

Q.1 a) What are 'd' block elements? Discuss the general characteristic features of 'd' block elements. 10

b) Describe the postulates of Werner's theory of co-ordination compounds. 10

OR

c) Give the electronic configuration of actinide series elements. 10

d) Discuss the following reactions in Liq. NH_3. 10

i) Acid-Base reaction

ii) Ammonolysis

Q.2 a) Describe ion exchange method for the separation of lanthanides. 10

b) Describe the concept of Acid-Base according to Lewis theory and give the types of Lewis acid. 10

OR

c) Write a short note on. (any four) 20

1) Oxidation state of first transition series elements
2) EAN Rule
3) Consequences of lanthanide contraction
4) Separation of Am from uranium
5) Conjugate acid-base pair
6) Precipitation reaction in Liq SO_2.

Q.3 Multiple choice questions. 10

1) Manganese belongs to
   a) 's' block
   b) 'p' block
   c) 'd' block
   d) 'f' block
2) Donor atoms in EDTA are
   a) Two N and two O
   b) Two N and four O
   c) Four N and two O
   d) Three N and three O
3) Lanthanide contraction is observed in
   a) Xe
   b) Zn
   c) Cd
   d) Gd

4) Transuranic elements begins with
   a) NP
   b) Cm
   c) Pu
   d) U

5) Which of the following is polar solvent
   a) CCl_4
   b) $C_6 H_6$
   c) H_2O
   d) None of these

6) According to Lowry-Bronsted theory, which one is an acid
   a) H_3O^+
   b) $SO4^{--}$
   c) OH^-
   d) CI^-

7) Which of the following transition metal shows variable valency
   a) Fe
   b) Sc
   c) Y
   d) Ac

8) The oxidation number of cobalt in $K[CO(CN)_4]$ is
   a) +1
   b) -1
   c) -3
   d) +3

9) The elements in which 4f orbitals are progressively filled are called as
   a) Actinides
   b) Halogens
   c) Transition elements
   d) Lanthanides

10) Which of the following is not Lewis acid
   a) BF_3
   b) $AlCl_3$
   c) $BeCl_2$
   d) NH_3

Total No. of Printed Pages:3

SUBJECT CODE NO:- N-2150
FACULTY OF SCIENCE
B.Sc. S.Y (Sem-IV) Examination Nov/Dec 2017
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
i. Attempt all questions.
ii. Figure to the right indicates full marks.
iii. Use of non-programmable calculator is allowed.

Q.1 a) What is phase-rule? Explain different terms involved in it. 10

b) What is transport-number? How it is determined by Hittorf's method. 10

OR

a) What is buffer solution? Explain the mechanism of acidic and basic buffer. 10

b) Explain effect of dilution on specific and equivalent conductance. 10
The resistance of 0.25 N salt solution is found to be 100 ohms between two electrodes which are 2.0cm apart and having cross section area 4 cm^2. Calculate equivalent conductance.

Q.2 a) Discuss phenol-water and triethyl-amine-water system. 10

b) What is electrochemical series? Give its significance. 10

OR

Write short notes on. (any four) 20
a) Freezing mixtures
b) Triple point
c) Application of Kohlrausch's law
d) Ostwald's dilution law
e) Standard hydrogen electrode
f) Dry corrosion

Q.3 Choose and write the correct answer of the following. 10

1) The maximum degrees of freedom for two component system is ----------.
1) 1
2) 2
3) 3
4) 4

2) The no. of phases in mixture of water and ethanol are ---------.
   a) 1
   b) 2
   c) Zero
   d) None

3) The degree of freedom of triple point is ----------.
   a) Zero
   b) 3
   c) 2
   d) 1

4) The unit of cell constant is ----------.
   a) Cm
   b) Cm^{-1}
   c) Cm^{2}
   d) Cm^{-2}

5) What is effect of dilution on equivalent conductance?
   a) Decreases
   b) Increases
   c) Both a and b
   d) Constant

6) Transport number of sliver ion in silver nitrate solution is 0.32. the transport number of nitrate ion will be ----------.
   a) 1
   b) 0.32
   c) 0.68
   d) Zero

7) The pressure of hydrogen gas in standard hydrogen electrode is -------- atmosphere.
   a) Zero
   b) 1
   c) 2
   d) 3

8) Cell which converts electrical energy into chemical energy is ----------.
   a) Electro-chemical cell
   b) Electrolytic cell
   c) Both a and b
   d) None of these above

9) The pH of solution is 9.2; the solution is ---------.
   a) Acidic
   b) Basic
   c) Both a and b
   d) Neutral

10) The critical pressure of water is --------- atmosphere.
   a) 374
   b) 218
   c) 100
   d) Zero

Total No. of Printed Pages:3

SUBJECT CODE NO:- N-2001
FACULTY OF SCIENCE
B.Sc. T.Y (Sem-V) Examination Nov/Dec 2017
Chemistry Paper –XIII
(Physical 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.

Q.1 A) Give the postulates of Bohr's theory of hydrogen atom. Give its defects. 10

B) What is rigid rotator? Derive an equation for moment of inertia of diatomic rigid rotator. Calculate reduced mass and moment of inertia of NaCl molecule if its bond length is $2.36A^0$. Atomic masses of Cl = 35.5 and Na=23.0 gm mol $^{-1}$. N=6.023 x 10^{23}. 10

OR

A) Draw Jablanski diagram and explain non radiative transitions. When the substance was exposed to light 0.003 moles of it reacted in 25 minutes. Calculate quantum yield if it absorbs 2.1 X 10^4 photons per second in the same time. 10

B) What is optical activity? How it is measured by polarimeter. 10

Q.2 A) Discuss rotational energy levels of rigid diatomic molecule with the help of suitable diagram. Explain how it helps in determining bond length of a diatomic molecule. 10

B) State and explain photo electric effect. Calculate de Broglie wavelength of a particle moving with velocity 2.18 X10^8 cms^{-1}.(Mass of particle, m=9.109 X 10^{-28} gm, h=6.62 X10^{-27} ergsec) 10

OR

Write short notes on any four of the following :- 20

a) Heisenberg uncertainty principle
b) Basic components of different spectrometers.
c) Quantum yield
d) Application of dipole moment in structure determination
e) High energy ball milling
f) Synthesis of nanomaterial's using plant extract.

Q.3 Select and write correct answer of the following multiple choice questions. 10

1) De Broglie's Wavelength of a particle is given as
   a) $\lambda = \frac{h}{v}$
   b) $\lambda = \frac{h}{mv}$
   c) $\lambda = \frac{h}{m}$
   d) $\lambda = \frac{h}{2\pi m}$

2) Angular momentum of an electron is integral multiple of
   a) $\frac{h}{2\pi}$
   b) $\frac{2\pi}{h}$
   c) $2\pi h$
   d) $\frac{h}{\pi}$

3) Which of the following shows rotational spectra…….
   a) Cl_2
   b) H_2
   c) HCl
   d) CO_2

4) The distance between two successive spectral lines in rotational spectra is
   a) B
   b) 2B
   c) 3B
   d) 4B

5) The selection rule for rigid rotator is
   a) $\Delta J = \pm 1$
   b) $\Delta J = \pm 2$
   c) $\Delta J = \pm 3$
   d) $\Delta J = 0$

6) Fluorescence occurs when transition is
   a) Triplet – Triplet
   b) Singlet – singlet
   c) Triplet – Singlet
   d) All of these

7) What will be quantum yield when one mole of substance reacts by absorbing 6.022×10^{23} photons .
   a) 0.1
   b) 1
   c) 10
   d) Zero

8) Dipole moment of benzene molecule is
   a) Zero
   b) One
   c) Two
   d) Three

9) Substance which rotates plane polarized light in clockwise direction is ---------.
   a) Leavorotatory
   b) Dextro rotatory
   c) Racemic mixture
   d) All of these

10) 0.1 nanometer is equal to
   a) $10^{-9}m$
   b) $10^{-8}m$
   c) $10^{-10}m$
   d) $10^{-11}m$

Total No. of Printed Pages:3

SUBJECT CODE NO:-N-2002
FACULTY OF SCIENCE
B.Sc. T.Y (Sem-V) Examination Nov/Dec 2017
Chemistry Paper -XIV(Organic Chemistry)

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

Please check whether you have got the right question paper.

N.B i) All questions are compulsory.

Q.1 a) An organic compound having molecular formula $C_5H_{11}Cl$ gave the following $'H\ NMR$ data: δ 1.0 $(t, 3H)$ 1.5 $(s, 6H)$ and 1.8 $(q, 3H)$ deduce the structure of the compound. 10

b) How will you prepared primary, secondary and tertiary alcohol by using Grignard reagent 10

OR

a) A compound C_9H_{12}gave the following NMR data 10

δ 2.1 $(S, 9H)$

δ 7.0 $(S, 3H)$

Deduce the structure of the compound.

b) Explain the synthesis of diethyl malonate and comment on the acidic nature of methylene hydrogen. 10

Q.2 a) Starting from acetoacetic ester, how the following compounds can be prepared: 10

i) Butanone
ii) Acetyl acetone
iii) Isobutyric acid

b) What are detergents? How are they obtained? 10

OR

a) Write short note on (any four) 20

i) Shielding and deshielding
ii) Chemical shift
iii) Organolithium
iv) Claisen condensation with mechanism
v) Synthesis of 4-methyl uracil from acetoacetic ester.
vi) Animal fats.

Q.3 Choose the correct option for the following 10

1) Which of the following compound shows only one $'H\ NMR$ signal
   a) Neopentane
   b) Xylene
   c) Chlorobenzene
   d) Benzoic acid

2) Chemical shift of aldehydic proton is
   a) 3.7 to 4.1
   b) 2.00-2.6
   c) 9-10
   d) 3-4

3) How many π bonds are present in enol form of ethyl acetoacetate
   a) Two
   b) One
   c) Three
   d) Four

4) The saponification value of oils can be determine by means of its .
   a) Octane number
   b) Saponification value
   c) Acid value
   d) Iodine value

5) Which of the following is not organometallic compound.
   a) R_2Cd
   b) RMgx
   c) RLi
   d) RCOONa

6) Alkyl magnesium bromide react with water gives
   a) Alkene
   b) Alkane
   c) Alcohol
   d) Aldehyde

7) Diethyl malonate react with Urea gives.
   a) Butyric acid
   b) Isobutyric acid
   c) Carboxylic acid
   d) Barbituric acid

8) In $'H\ NMR$ ethanol shows ---------- signals
   a) One
   b) Two
   c) Three
   d) Four

9) Hard soaps are obtained by hydrolysis of oils or fats using.
   a) KOH
   b) NaOH
   c) HCl
   d) H_2SO_4

10) Ketonic hydrolysis of ethyl acetoacetate gives
   a) Acetone
   b) Cyclohexanone
   c) Alcohol
   d) Acetic acid

Total No. of Printed Pages:3

SUBJECT CODE NO:-N_2007
FACULTY OF SCIENCE
B.Sc. F.Y (Sem.-I) Examination Nov/Dec 2017
Chemistry Paper-I (Inorganic 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) Illustrate your answer with suitable labeled diagram.

Q.1 a) What are quantum numbers? Explain magnetic Quantum number and spin Quantum number. 10

b) What is electronegativity? Explain the trends in periodic table. 10

OR

c) What are S-block elements? Explain role of alkali metals in biological system. 10

d) What are interhalogen compounds? Explain in detail AX_3 and AX_5 type of interhalogen compound. 10

Q.2 a) State and explain Heisenberg's Uncertainty principle and Hund's rule of maximum Multiplicity. 10

b) Explain the hydrides and oxides of group IVA or 14^{th} Elements. 10

OR

Write short notes on any four of the following. 20

a) Postulates of Bohr's atomic theory.
b) Diagonal relationship of Be with Al.
c) Electronic Configuration of II A or alkaline earth metal.
d) Oxides of group V A or 15^{th} elements.
e) Hydrides of group 13 elements.
f) Ionization potential

Q.3 Attempt the following 10

1) Shape of d-orbital is
   a) Spherical
   b) Dumb bell
   c) Double dumb- bell
   d) None of these

2) Orientation of sub- orbitals represented by
   a) Azimuthal quantum number
   b) Principle quantum number
   c) Magnetic quantum number
   d) Spin quantum number

3) Electron affinity depends on ----------.
   a) Atomic size
   b) Nuclear charge
   c) Atomic number
   d) Atomic size and nuclear charge both.

4) The element's with highest electron affinity among halogen is
   a) F
   b) Cl
   c) Br
   d) I

5) Which of the following sets of atomic number belongs to that of alkali metals
   a) 19 and 03
   b) 2 and 12
   c) 9 and 7
   d) 12 and 20

6) Which of the following is most electronegative?
   a) Tin
   b) Lead
   c) Silicon
   d) Carbon

7) Which of the following element is present in chlorophyll.
   a) Ca
   b) Na
   c) Mg
   d) K

8) Elements with atomic number 11 belongs to which block.
   a) s
   b) p
   c) d
   d) f

9) Of the given alkali metal's below which is the smallest in size.
   a) Rb
   b) Cs
   c) K
   d) Na

10) Which of the following is interhalogen compound.
   a) NaCl
   b) HCl
   c) ICl_3
   d) KCl.

Total No. of Printed Pages:03

SUBJECT CODE NO:- N-2008
FACULTY OF SCIENCE
B.Sc. F.Y (Sem-I) Examination Nov/Dec 2017
Chemistry Paper-II (Organic Chemistry)

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

Please check whether you have got the right question paper.

N.B i)Attempt all question
ii) Use blue or black pen only

Q.1 a) How product analysis and isotope effect helps in determination of mechanism of organic reaction? 10

b) Define structural isomerism. Give its classification. 10

OR

c) Discuss concept of resonance and charge transfer complexes. 10

d) Comment on structure of carbanion. Explain, why tertiary butyl carbanion is less stable than ethyl carbanion. 10

Q.2 A) i) Explain Nitration and sulphonation of alkenes. 05

ii) Explain polymerization of alkenes. 05

B) i)Explain molecular orbital picture of benzene 05

ii) Write a note on nuclear reactions of aryl halide. 05

OR

Write short notes on (<u>any four</u>) 20

a) Elimination reaction
b) D-L notation system
c) Decarboxylation of carboxylic acids
d) Peroxide effect
e) Aromaticity
f) Nucleophilic aromatic substitution reaction of aryl halide with mechanism.

Q.3 Choose and write the correct answer of following 10

1 Inter molecular H-bonding _____ water solubility of organic compounds

a) Decreases
b) Increases
c) Does not affect
d) First increase then decreases

2 Electron availability within a molecule does not depend upon which of the following effect.

a) Inductive
b) Resonance
c) Peroxide
d) Hyper conjugation

3 The order of stability of carbanion is

a) $1^0>2^0>3^0$
b) $3^0>2^0>1^0$
c) $2^0>3^0>1^0$
d) $1^0>3^0>2^0$

4 Dextrorotatory enantiomer rotates the PPL in _____ direction.

a) Clockwise
b) Anticlockwise
c) Both a & b
d) None of above

5 Chloroform has _____ axis of symmetry.

a) C_2
b) C_3
c) C_4
d) C_5

6 Alkyl groups are formed by replacement of _____ H-atom of corresponding alkane.

a) Four
b) Three
c) Two
d) One

7 Alkenes are soluble in _____

a) Water
b) Alcohol
c) Both a & b
d) None of above

8 $CH_3 - CH_2 - Cl \xrightarrow{alc.KOH} CH_2 = CH_2 + kcl + H_2O$ is _____ reaction

a) 1,1 Elimination
b) 1,1 addition
c) 1,2 Elimination
d) 1,2 addition

9 Which compound is used as fire extinguisher under the name of pyrene

a) Benzene
b) CH_3OH
c) $CHCl_3$
d) CCl_4

10 The aromatic compounds have _____ π- electron system.

a) 4n
b) 4n+1
c) 4n+2
d) 4n+3

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SUBJECT CODE NO: N_2013
FACULTY OF SCIENCE
B.Sc. S.Y (Sem-III) Examination Nov/Dec 2017
Chemistry Paper-VII (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) Use blue or black pen only.

Q.1 a) Explain following reactions of phenol with their mechanism. 10

i) Intermolecular fries rearrangement.

ii) Claisen rearrangement.

b) Explain knoevenagel condensation with mechanism. 10

OR

c) How will you prepare. 10

i) Ethanol from acetaldehyde.

ii) Propan- 2-0l from Propanone.

iii) Ethanol from ethanoic acid.

iv) Ethanol from ethyl acetate.

d) Give chemical reactions of tartaric acid. 10

Q.2 A) How will you prepare primary amines by 10

i) Reduction of nitro compounds

ii) Reduction of nitriles.

iii) Reductive amination of aldehydes and ketones.

B) Explain chemical reactions of nitroalkanes 10

OR

C) Write short notes on (any four) 20

i) Use of acetal as protecting group

ii) HVZ reaction

iii) Baeyer – villiger oxidation

iv) Hoffmann bromamide reaction for preparation of amine

v) Reaction of amines with nitrous acid

vi) Basic nature of amines

Q.3 Choose and write the correct answer of the following questions 10

(answer all questions)

1) Which of the following is primary alcohol?

a) Butan - 1 - o1

b) Butan -2 - o1

c) Propan -2 -o1

d) Isopropyl alcohol

2) Phenol on carboxylation gives.

a) Benzoic acid.

b) Salicylic acid

c) Formic acid.

d) Acetic acid.

3) Which of the following compound does not contain –OH group?

a) Phenol

b) Carboxylic acid.

c) Aldehyde

d) Alcohol.

4) Sodium salts of carboxylic acids on heating with sodalime give.

a) Phenols

b) Alcohols

c) Ketones.

d) Alkanes.

5) Alkyl halides on heating with aqueous ethanolic solution of silver nitrite give.
   a) Amines
   b) Phenols
   c) Alcohols
   d) Nitro alkanes.

6) Aldehydes on oxidation with chromium trioxide and aqueous sulphuric acid give
   a) Alcohol
   b) Phenol
   c) Carboxylic acid
   d) None of these.

7) Acetic acid reacts with methyl alcohol in the presence of an acid catalyst to give
   a) Methyl formate
   b) Methyl acetate
   c) Ethyl formate
   d) Ethyl acetate

8) Aniline reacts with bromine to form.
   a) 2,4,6 – tribromo aniline.
   b) 2,4,5 – tribromo aniline.
   c) 2,4 – dibromo aniline
   d) 2, 6 –dibromo aniline

9) Ethyl acetate on hydrolysis gives
   a) Ethyl alcohol and acetic acid
   b) Ethylene and ethyl alcohol
   c) Acetaldehyde and acetic acid
   d) Acetaldehyde and ethyl alcohol

10) The central nitrogen atom in amines is

a) SP^2 hybridised

b) SP^3 hybridised

c) SP hybridised

d) $SP^3 d^2$ hybridised.

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SUBJECT CODE NO:- N_2014
FACULTY OF SCIENCE
B.Sc. S.Y (Sem-III) Examination Nov/Dec 2017
Chemistry Paper-VIII (Physical 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) Illustrate your answer with suitable diagram.

Q.1 a) State and explain Hess's law of heat summation. Give its applications. 10

b) What is Gibb's free energy? Give its variation with respect to temperature and pressure. 10

OR

c) Define the terms isothermal, adiabatic, reversible and irreversible process with suitable example. 10

d) Give the various statement of second law of thermodynamics. Calculate the efficiency and amount of heat supplied by Carnot cycle operating between temperature 310 k to 400 k, if maximum work obtained is 675 joules. 10

Q.2 a) State and explain Le-Chatelier's principle. What is the effect of change of concentration, pressure and temperature 10

b) Explain how entropy can be used as criteria of spontaneity and equilibrium 10

OR

Write short notes on any Four of the following 20

a) Intensive and extensive properties.
b) First law of thermodynamics.
c) Carnot theorem
d) Entropy and its physical significance.
e) Law of mass action.
f) Reaction isotherm.

Q.3 Multiple choice questions. 10

1) The enthalpy of a system is defined by the relation.
   a) H = E + PV
   b) H = E- PV
   c) E = H + PV
   d) E = PV – H

2) Example of intensive property is.
   a) Surface tension
   b) Density
   c) Viscosity
   d) All of these.

3) A part of the universe which is under thermodynamic study is called
   a) Surrounding
   b) System
   c) Process
   d) None of these.

4) 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
   c) Molar heat capacity
   d) Molar capacity.

5) Entropy is a measure of ---------- of the molecules of the system.
   a) randomness
   b) Concentration
   c) Velocity
   d) Zig – Zag motion

6) A process is in the equilibrium state when
   a) $\Delta G > 0$
   b) $\Delta G < 0$
   c) $\Delta G = 0$
   d) None of these

7) In a process $\Delta H = 100KJ$ and $\Delta S = 100\ JK^{-1}$ at 400K , the value of ΔG will be
   a) Zero
   b) 60 KJ
   c) 100 KJ
   d) 200 KJ

8) Which is the correct unit for entropy
   a) KJ mol
   b) JK^{-1} mol
   c) $JK^{-1}\ mol^{-1}$
   d) None of these.

9) Equilibrium reactions are characterized by
   a) The presence of both reactants and product in a definite proportion.
   b) Going to completion
   c) Being non- spontaneous
   d) All of these.

10) $\frac{dp}{dT} = \frac{\Delta H}{T(V_2 - V_1)}$ is a
   a) Gibb's equation
   b) Vant Hoff isotherm
   c) Vant Hoff isochore
   d) Clapeyron equation

Total No. of Printed Pages:2

SUBJECT CODE NO: N-2048
FACULTY OF SCIENCE
B.Sc. T.Y (Sem-VI) Examination Nov/Dec 2017
Chemistry Paper –XVI (Inorganic 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) Illustrate your answer with suitable diagram.

Q.1 (a) Discuss the splitting of d-orbitals in octahedral metal complexes. 10
(b) Describe the nature of bonding in metal carbonyls. 10

OR

(c) Explain the electronic spectrum of $[Ti(H_2O)_6]^{3+}$ Complex ion. 10
(d) Explain i) Spectrochemical series 10
ii) $\Delta_t = \frac{4}{9}\ \Delta_o$

Q.2 (a) Discuss the principle and technique of paper chromatography. 10
(b) What are Mettalloporphyrins? Explain the role of hemoglobin in biosystem. 10

OR

(c) Write short notes on any four of the following 20
1) Limitations of valence bond theory.
2) Spin selection rule
3) Role of alkali metals in biosystem.
4) Rf value.
5) Metal ethyllinic complexes.
6) Classification of organometallic compounds.

Q.3 Multiple Choice questions. 10

1) The number of unpaired electrons in d^5 system.
a) 5 b) 4
c) 3 d) 0

2) The energy of t2g orbitals in octahedral complex decreases by
a) -6Dq b) -4Dq
c) +4Dq d) +6Dq

3) The complexes formed by strong Field ligands are called as
   a) Low spin b) high Spin

   c) No spin d) All of these

4) The ground term symbol for d^9 system is
   a) 6S b) 2D
   c) 3F d) 4F

5) Spin multiplicity is equal to
   a) S+1 b) S-1

   c) 2S+1 d) 2S-1

6) The IUPAC name of the C_2H_5MgBr is

   a) ethyl magnesium bromide b) bromo magnesium ethyl

   c) magnesium ethyl bromide d) none

7) Symmetrical simple organometallic compound is
   a) $CH_3MgC_2H_5$ b) $C_2H_5SnC_3H_8$

   c) $(CH3)_2^{zn}$ d) All of these

8) The metal present in chlorophyll is
   a) Mg b) Mn
   c) Fe d) Zn

9) In the paper chromatography, mobile phase is
   a) Solid b) Liquid
   c) gas d) All of these

10) Nitrogen fixation is carried out by bacteria
   a) E coil b) Rhizobium
   c) pleurococcus pneumonia d) None of these

Total No. of Printed Pages:02

SUBJECT CODE NO:- N-2049
FACULTY OF SCIENCE
B.Sc. T.Y (Sem-VI) Examination Nov/Dec 2017
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

Q.1 A) What are carbohydrates? Give the classification of carbohydrates with example. 10

B) What are Heterocyclic compounds? Explain with mechanism, the nitration & sulphonation of pyrrole. 10

OR

A) Give the inter conversion of glucose and fructose. 10

B) Give the synthesis of Quinoline by Skraup's method and Indole by fischer indole method. 10

Q.2 A) i) What are drugs? Give the properties of an ideal drug. 06

ii)Give the synthesis of :- 06
a)Phenacetin b)sulphaguanidine

B) What are polymers? Give the synthesis of Polyvinyl acetate and polyacrylonitrile 08

OR

Write short note on (any four) 20

a) Molecular orbital picture of Thiophene

b) Compare the basicity of pyridine, piperidine and pyrrole.

c) Cellulose

d) Constitution of dyes

e) Synthesis of Alizarin

f) Synthesis of congo red

Q.3 Multiple Choice Questions. 10

1.Maltose is an example of ----------

a)monosaccharides b)Disaccharides

c)Trisaccharides d)Polysaccharides

2.Number of asymmetric carbon atoms in glucose is ----------

a)1 b)2

c)4 d)6

3.Pyridine reacts with HCL to form----------

a)Pyridinium chloride b)3 chloropyridine

c)2 chloropyridine d)All of these

4. Furan reacts with ammonia in the presence of alumina at 400^0 C to form----------

a)Furoic acid b)Pyrrole

c)Furfural d)None of these

5. The product of Bischler- Napirlasky synthesis is--------

a)Pyridine b)Pyrrole

c)Quinoline d)Isoquinoline

6. Condensation Polymerisation of hexamethylene diamine and adipic acid produces--------

a)Nylon-6 b)Terylene

c)Nylon-66 d)All of these

7.Natural rubber is a polymer of ---------

a)Isobutylene b)chloroprene

c)Isoprene d)vinyl chloride

8.Which dye is used as medicine---------

a)crystal violet b)congo red

c)methyl orange d)Alizarin

9.Which drug is used as an antiseptic----------

a)Paracetamol b)sulphaguanidine

c)Phenacetin d)None of these

10.Which of the following is not a chromophore----------

a)$-N=N-$ b)$-NO$

c)$-NO_2$ d)$-NH_2$