SLR-EF-1

Seat No.	

Set P

M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
CHEMISTRY
Physical Chemistry – I (2324101/2325101/2326101/2327101) (2302101/2303101/2304101/2305101)

Day & Date: Friday, 05-01-2024 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory
2) Figure to right indicate full marks
3) Use of log table/calculator is allowed.

Q.1 A) Choose correct alternative. **08**

1) The kinetic energy of a photoelectron is varies with _____.
   a) frequency of incident radiation
   b) intensity of incident radiation
   c) metal surface
   d) all of these

2) All gases behaves ideally as _____.
   a) $P \to 1$ b) $P \to 0$
   c) $P \to \infty$ d) $P \to -1$

3) $(\delta T/\delta P)s = (\_\_ /\delta S)p$
   a) δG b) δN
   c) δV d) δH

4) Compton shift depends upon _____.
   a) angle of scattering
   b) Mass of the particle
   c) wavelength of incident radiation
   d) Both (a) and (b)

5) In Grand canonical ensemble T, V and _____ remains constant.
   a) P b) T
   c) μ d) E

6) The mathematical statement for Boltzmann-Planck equation is given as _____.
   a) S=k lnW b) S=k N lnW
   c) S= k/lnW d) S= lnW/k

7) The fugacity of a solute in dilute solution is proportional to its mole fraction. This statement belongs to _____.
   a) Henry's law b) Raoult's law
   c) Planck's law d) Boyle's law

8) The reduced form of Gibbs' phase rule is given as _____.
   a) F= C-P+2 b) F= C-P-2
   c) F= C-P+1 d) F= C-P-1

B) Fill in the blanks OR Write true/false. **04**

1) The quantization concept was given by the scientist _____.
2) The entropy of a substance at absolute zero temperature is infinite. (True/False)
3) The most probable configuration is that configuration which has highest microstates. (True/False)
4) The zero point energy for a particle in three dimensional box is given as_____.

Q.2 Answer the following (Any Six) **12**

a) Define degrees of freedom.
b) What do you mean by the term most probable configuration?
c) Define ensemble. Mention different types of ensembles.
d) What is the mathematical expression for energy of an electromagnetic radiation? Give the significance of the terms involved in it.
e) Give the statement for third law of thermodynamics.
f) Define perfect black body? Mention its characteristics.
g) Mention any two Maxwell's relations.
h) State Henry's law.

Q.3 Answer the following (Any Three). **12**

a) Derive the expression for Gibbs' phase rule. Give its applications.
b) Explain in detail microcanonical and canonical ensemble.
c) Write on Bohr atomic model.
d) The mass of a particle is 9.11×10^{-28} g and velocity is 3×10^{-8} m/s, calculate its de Broglie wavelength. Comment on the result.

Q.4 Answer the following (Any Two). **12**

a) Define fugacity. Discuss fugacity determination by graphical method.
b) Derive the expression $n_i = e^{-(\alpha+\beta\varepsilon i)}$. Give the significance of the terms α and β.
c) Derive Schrodinger wave equation (time independent).

Q.5 Answer the following (Any Two). **12**

a) Discuss the freezing point depression method for determination of activity coefficient.
b) Explain how third law of thermodynamics can be used in the estimation of absolute entropy of a gas at 298 K.
c) Define microstates and configurations. Explain them with suitable examples.

SLR-EF-2

Seat No.	

Set P

M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
CHEMISTRY
Organic Chemistry - I (2324102/ 2325102/ 2326102/ 2327102) (2302102/ 2303102/ 2304102/ 2305102)

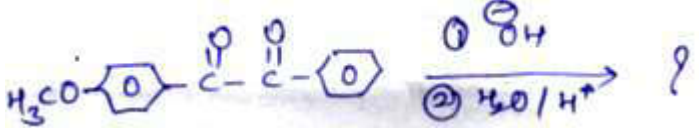
Day & Date: Sunday, 07-01-2024 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

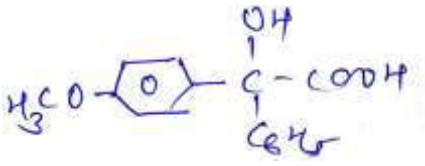
Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

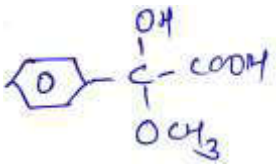
Q.1 A) Choose the correct alternatives from the options. **10**

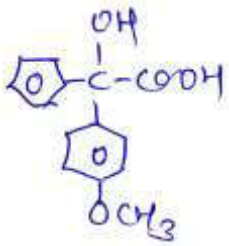
1) α-diazoketones on thermal or photochemical decomposition rearranges to _____.
   a) ketene b) isocyanate
   c) carbene d) nitrene

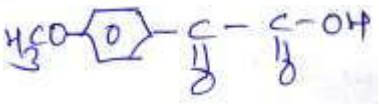
2) _____ is the major product of the following reaction.



a) 

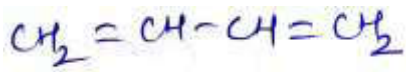
b) 

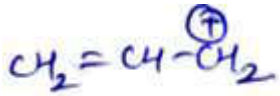
c) 

d) 

3) _____ is the non-alternant hydrocarbon.

a) 

b) 

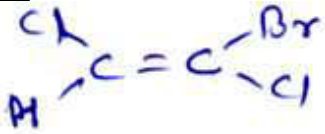
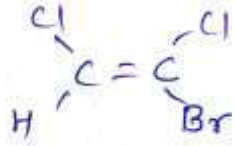
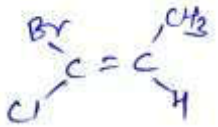
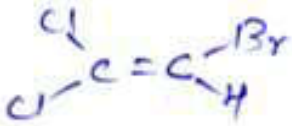
c) 

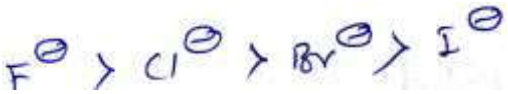
d) 

4) γ - cyclodextrin contains _____ glucose units per ring.
   a) 6 b) 7
   c) 8 d) 9

5) _____ of nitro and nitroso compounds generates nitrenes.
   a) Oxygenation b) Deoxygenation
   c) Reduction d) Diazotization

6) The Taft equation is a structure reactivity equation that correlates _____ with reactivity.
   a) Resonance effects b) Steric factors
   c) Field effects d) Field effects & steric factors

7) _____molecule will not show geometrical isomerism.
   a) 
   b) 
   c) 
   d) 

8) The correct order of nucleophilicity of halides in aprotic solvents (e.g. DMF) is _____.
   a) 
   b) 
   c) 
   d) 

B) State True/False: **04**

1) Bicyclic crown ethers and crown ethers of cycles of higher order are called cryptands.
2) Thermal conversion of hydroxamic acids and their derivatives to ketene is called as Lossen rearrangement.
3) SE_1 reaction involves retention of configuration in the product.
4) In case of 1,3 disubstituted (with identical substituents), two cis and one trans chair conformations are possible.

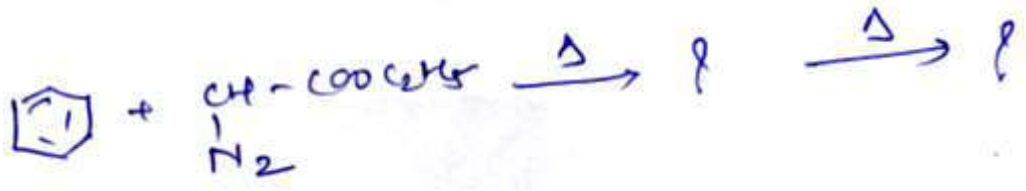
Q.2 Answer the following. (Any Six) **12**

a) Explain the migratory aptitude in Baeyer-Villiger rearrangement reaction.
b) Explain with suitable example nucleophilic substitution at an allylic carbon.
c) Describe aromatic nature of tropone and tropolone.
d) Explain hyperconjugation effect.
e) Explain the term diastereoisomerism with suitable example.

f) Explain the term centre of symmetry with suitable example.

g) Complete the reaction

h) Complete the reaction



Q.3 Answer the following. (Any Three) **12**

a) Explain with suitable example SET mechanism.

b) Explain the aromatic nature of azulene. Give its synthesis and chemical properties.

c) Give the different methods for generation of carbenes.

d) Explain with suitable examples E & Z nomenclature.

Q.4 Answer the following. (Any two) **12**

a) Explain stereochemistry of spiranes and alkenes.

b) Explain with suitable example neighbouring group participation in nucleophilic substitution reaction.

c) Explain generation and reaction of carbanions.

Q.5 Answer the following. (Any two) **12**

a) Define crown ethers. Explain with suitable examples synthesis and applications of crown ethers.

b) Explain Curtius rearrangement with respect to mechanism and applications.

c) Explain with suitable examples reaction mechanism of SE_1 and SE_2 reactions.

SLR-EF-3

Seat No.	

Set P

M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
CHEMISTRY
Inorganic Chemistry – I (2324107/2325107/2326107/2327107) (2302107/2303107/2304107/2305107)

Day & Date: Tuesday, 09-01-2024 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

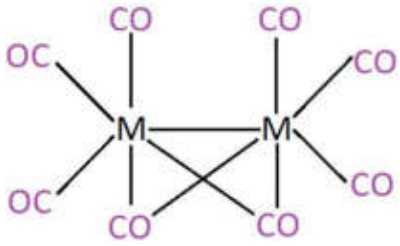
Instructions: 1) Attempt in all question
2) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **08**

1) According to the ligand field theory:
   a) π-donor ligands decrease Δ_o; π-acceptor ligands increase Δ_o
   b) π-donor ligands increase Δ_o; π-acceptor ligands decrease Δ_o.
   c) Both, π-donor and π-acceptor ligands decrease Δ_o.
   d) None of these

2) _____ is the geometry of pentacarbonyliron(0).
   a) Square planar b) Tetrahedral
   c) Trigonal bipyramidal d) Octahedral

3) The following structure of a carbonyl compound is formed by which transition metal.



   a) Ni b) Co
   c) Mn d) Cr

4) Beta emission is associated with _____
   a) conversion of a neutron to a proton.
   b) conversion of a proton to a neutron.
   c) increase in mass number.
   d) decrease in mass number by 4 and atomic number by 2.

5) As a ligand, Cl^- is _____.
   a) σ-donor b) π-donor
   c) both σ & π donor d) σ donor and σ acceptor

6) Antibonding molecular orbitals are produced by _____.
   a) destructive interaction of atomic orbitals.
   b) the overlap of the atomic orbitals of two negative ions
   c) constructive interaction of atomic orbitals.
   d) all of these

7) Paramagnetism is common in _____.
   a) s-block elements b) d-block elements
   c) p-block elements d) Any of them

8) If a nitrogen-14 nuclide captures an alpha particle, a proton is produces along with _____

a) Neutrons b) Boron-10
c) Oxygen-17 d) Carbon-17

B) Write True/False. **04**

1) Nucleons are held together in a nuclide by the electromagnetic force.
2) The metal-carbon bond in metal carbonyls possesses only sigma character.
3) O_2 molecule is paramagnetic on the basis of MOT.
4) If the metal is in high oxidation state and the ligands contain nonbonding electrons, then: Ligand-to-metal charge-transfer transitions are observed.

Q.2 Answer the following. (Any six) **12**

a) What is nephelauxetic effect.
b) Predict the shape and bond angles in the SF_4 and ClF_3.
c) Write any two types of solids.
d) What is the Bent rule?
e) What is the difference between the metal cluster and metal carbonyl?
f) What is the photoelectric effect?
g) What are Q values?
h) What is F-center/color center?

Q.3 Answer the following. (Any Three) **12**

a) Explain the ligand field energy parameters in detail.
b) Write a note on the energetics of hybridization.
c) What are semiconductors? Explain in brief intrinsic semiconductors.
d) Write a note on the application of radio isotopes.

Q.4 Answer the following. (Any Two) **12**

a) State and explain Jahn-Teller theorem. Show schematically the splitting of d-orbitals in d^7 case for octahedral and tetrahedral system.
b) Discuss the effect of lone pairs and effect of electronegativity on the shapes of molecules, according to VSEPR theory.
c) Explain nuclear fission and fusion reaction.

Q.5 Answer the following. (Any Two) **12**

a) What are the rectifiers? Explain its construction and working.
b) Preparation, properties & structures of mono, di & tri nuclear carbonyl complexes.
c) Explain the electronic spectra using spectrochemical series, nephelauxetic effect and nephelauxetic series.

SLR-EF-6

Seat No.		Set	P

M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
CHEMISTRY
Research Methodology (2324103/2325103/2326103/2327103) (2302103/2303103/2304103/2305103)

Day & Date: Thursday, 11-01-2024 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

Instructions: 1) All Questions are compulsory.
2) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **08**

1) In polarography residual current is generated due to _____.
   a) reduction of impurities b) by Helm-Holdz double layer
   c) diffusion of analyte d) both a) and b)

2) Widely used supporting electrolytes in polarography are _____.
   a) EDTA b) Potassium salt
   c) 4° ammonium salt d) copper salt

3) _____ parameter is measured in DTA.
   a) dH. dt b) ΔT
   c) Mass d) dm/dt

4) In XRD _____ methods are used for investigation.
   a) X-ray absorption b) X-ray fluorescence
   c) TG & DTA d) Laue & Rotating crystal

5) _____ type nebuliser is used for handling slurries that can contain upto 10 % solids.
   a) Babington b) Jet
   c) Ultrasonic d) None of these

6) Signal splitting in NMR arises from _____.
   a) Shielding effect b) Spin-spin decoupling
   c) Spin-spin coupling d) Deshielding effect

7) _____ includes data concerning the family background and educational development.
   a) Case study b) General behaviour
   c) genetic Approach d) Adequacy

8) Research is basically _____.
   a) a methodology of enquiry
   b) Search of truth
   c) a systematic exploration of facts
   d) All of the above

B) Fill in the blanks. **04**

1) In Amperometry the mercury forms amalgams with many metals and thus decrease their _____.
2) In DTA studies _____ types of gaseous atmospheres are used.
3) The difference in energy ΔE between $+1/2$ and $-1/2$ spin state of a proton is directly proportional to strength of _____.
4) Google Scholar easily allows you to explore authors related research works _____.

Q.2 Answer the following. (Any Six) **12**

a) Define Chemical Shift
b) What are the instrumental factors that affect thermogravimetric curves.
c) Write a short note on Construction of DME
d) Why alkene protons are deshielded, Justify?
e) Explain with diagram the Simultaneous multielement spectrometer
f) What is meant by impact factor of a journal?
g) What is sci finder?
h) What is Chem draw?

Q.3 Answer the following. (Any Three) **12**

a) Explain the following terms in Thermogravimetry.
1) Recording of results
2) Information from a TG curve
b) Give details about Ilkovic equation.
c) What are the factors that affect Chemical Shift?
d) What is Hypothesis? What are different types of Hypothesis?

Q.4 Answer the following. (Any Two) **12**

a) Describe instrumentation for Differential Thermal Analysis (DTA).
b) What is the principle of amperometry? Give any two graphs produced by different analytes.
c) An organic compound of molecular formula $C_9H_{10}O_2$ shows the following features:
IR (KBr): 1780cm^{-1}; 3095cm^{-1}
^{1}HNMR: 9.2δ (s, 1H); 1.3δ (t, 3H, J= 7.2 Hz); 3.9δ (q, 2H, J= 7.2 Hz); 7.5δ (d, 2H, J=7.5Hz); 7.0δ (d, 2H, J=7.5Hz)
Make proper assignment of the data

Q.5 Answer the following. (Any Two) **12**

a) Discuss in details the applications of Thermogravimetry
b) Derive an equation for Half- Wave potential.
c) What is Research Problem? What condition need to be followed while selecting a research problem?

SLR-EF-7

Seat No.	

Set P

M.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY
Inorganic Chemistry - I (MSC05101)

Day & Date: Friday, 05-01-2024 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. (MCQ) **10**

1) Ag^+ is isoelectronic with _____.
   a) Cu^+ b) Au^{3+}
   c) Zn^{2+} d) Cd^{+2}

2) _____ is not used as a moderator.
   a) Heavy water b) Water
   c) Graphite d) Boron

3) The oxidation state of Mn in $KMnO_4$ ion is _____.
   a) $+5$ b) $+6$
   c) $+7$ d) $+4$

4) Nuclear energy is based on conversion of _____.
   a) Proton to neutrons b) Mass into energy
   c) Neutrons into protons d) Uranium into radium

5) The colour of the d-block elements is due to _____.
   a) $nd-(n+1)s$ transition b) $nd-(n+1)p$ transition
   c) $nd-nd$ transition d) $nd-(n+1)d$ transition

6) The percentage s-character in sp^3 hybridization is _____.
   a) 50 b) 33
   c) 75 d) 25

7) 'Zn^{2+} complexes are atypical of d-block complexes in general." _____ answer below is correct and supports this statement.
   a) Zn^{2+} complexes are paramagnetic
   b) Zn^{2+} complexes tend to be colourless, unless the ligand contains a chromophore.
   c) Zn^{2+} complexes are always octahedral
   d) Zn^{2+} is one of several common oxidation states of Zn

8) _____ series correctly places the ligands in order of increasing nephelauxetic effect?
   a) $Br^- < Cl^- < NH_3 < H_2O$ b) $I^- < Br^- < H_2O < [OH]^-$
   c) $F^- < Cl^- < H_2O < NH_3$ d) $I^- < Cl^- < H_2O < en$

9) The spin only magnetic moment value (in Bohr magneton units) of $Cr(CO)_6$ is _____.
   a) 4.90 b) 2.84
   c) 5.92 d) 0

10) The atomic number of radioactive elements was increased by one unit in _____.
   a) Alpha emission b) Beta emission
   c) Gamma emission d) Electron capture

B) Fill in the blanks. **06**

1) The EAN for iron in Fe $(CO)_5$ is _____.
2) The geometry of NH_4^+ molecules is _____
3) A _____material, large domains of magnetic dipoles are aligned in the same direction.
4) Hydrogen bomb is based on _____ phenomenon.
5) The percentage of empty space in a body centred cubic arrangement is _____.
6) A pi- donor ligand is donates _____ to the metal center in an interaction that involve a filled ligand orbital and an empty metal orbital.

Q.2 Answer the following. **16**

a) How will you distinguish the intrinsic and extrinsic semiconductors?
b) Explain mass defect and binding energy of the nucleus.
c) Explain the Bent rule with suitable example.
d) Explain why $[FeF_6]^{3-}$ is almost colorless whereas $[CoF_6]^{3-}$ is colored.

Q.3 Answer the following.

a) What are the semiconductors? Discuss the doping of semiconductors and their conduction mechanism. **08**
b) What are the photovoltaic cells? Explain its construction and working. **08**

Q.4 Answer the following.

a) Explain in detail ligand field energy parameter. **08**
b) State and explain Jahn-Teller theorem. Show schematically the splitting of d-orbitals in d^7 case for octahedral and tetrahedral system. **08**

Q.5 Answer the following.

a) What are radioactive techniques? Explain tracer techniques and neutron activation analysis. **08**
b) Write the postulates of VSEPR theory. Explain the structure of SF_4 molecule. **08**

Q.6 Answer the following.

a) What are nuclear reactions? Discuss the nuclear fission reaction with suitable examples. **08**
b) Give in detail explanation of metal carbonyl structure -Low nuclear carbonyl structure. **08**

Q.7 Answer the following.

a) Write the preparation, properties & structures of mono, di & trinuclear carbonyl complexes. **08**
b) Write a short note on diamagnetism, paramagnetism, ferromagnetism. **08**

SLR-EF-8

Seat No.	

Set P

M.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY
Organic Chemistry-I (MSC05102)

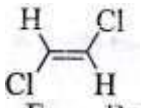
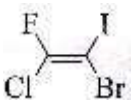
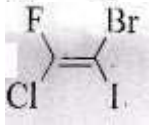
Day & Date: Sunday, 07-01-2024 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any Three questions from Q.No.3 to Q.No.7.
3) Figures to the right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) Huckels molecular orbital theory is applied to _____ system.
   a) Conjugated b) Non-conjugated
   c) Isolated d) None of these

2) _____ substituents stabilize the carbanion.
   a) Electron donating b) Electron withdrawing
   c) Both A and B d) None of these

3) _____ is Z- isomer.
   a)  b) 
   c)  d) None

4) Secondary allyl carbocation stabilized is _____.
   a) Resonance effect b) Inductive effect
   c) Hyperconjugation d) All of these

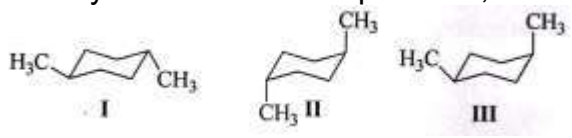
5) Which reaction is usually favored by a polar protic solvent?
   a) SN1 b) SN2
   c) SNi d) Both A and B

6) C_{60} fullerene having _____ pentagon.
   a) 20 b) 12
   c) 18 d) All of these

7) In Wolff rearrangement reaction _____ intermediate is formed.
   a) Carbocation b) Carbanion
   c) Nitrene d) Carbene

8) Which of the following groups are meta-directing?
   a) -CN b) $-NO_2$
   c) -NHCOR d) Both A and B

9) Stability order for the compounds I, II and III is



   a) I > III > II b) III > I > II
   c) II > III > I d) None

10) Each electron moving in molecular orbital is having _____ spin.
   a) Clockwise
   b) Counter-clockwise
   c) Clockwise or Counter-clockwise
   d) None of these

B) Fill in the blanks. **06**

1) Hammett equation accounts for how field, inductive and resonance effect influence the rate of the reaction while Taft equation also describes _____ effect of the substituents.
2) A single bond formed between two atoms by overlapping of orbitals along their axis is known as _____.
3) _____ reactive intermediate formed in SN^1 reaction.
4) Nucleophiles which can attack the substrate through two or more atoms to give different products are called _____.
5) Allenes and spiranes are optically active due to the presence of ___.
6) If the compound rotates the plane of polarization to the right (clockwise), it is said to be _____.

Q.2 Answer the following. **16**

a) Write note on: Tautomerism.
b) Write note on: Ambident nucleophiles
c) Define the following term with suitable examples
   i) Alternant hydrocarbons
   ii) Non- alternant hydrocarbons
d) Write note on: Hammett equation

Q.3 Answer the following.

a) Taking examples of some cyclohexane derivatives discuss effect of conformation on chemical reactivity. **08**
b) What are free radicals? Give some reactions of free radical. **08**

Q.4 Answer the following.

a) Explain Huckel rule for aromaticity? **08**

b) What is carbocation? How they are formed? Discuss factors affecting on their stability. **08**

Q.5 Answer the following.

a) Explain aliphatic SN2 reaction with respect to: **08**

i) effect of substrate structure
ii) attacking nucleophile
iii) leaving group
iv) reaction medium

b) Discuss the methods for determining the mechanism of organic reactions. **08**

Q.6 Answer the following.

a) Explain methods for resolution of racemic mixture. **08**

b) Explain orientation and reactivity in monosubstituted benzenes. **08**

Q.7 Answer the following.

a) Discuss optical activity of allenes and biphenyls. **08**

b) What are Crown ethers? Give some methods of preparation and applications of Crown ethers? **08**

SLR-EF-9

Seat No.	

Set P

M.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY
Physical Chemistry – I (MSC05103)

Day & Date: Tuesday, 09-01-2024 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. (MCQ) **10**

1) The reduced form of Gibbs' phase rule is _____.
   a) $F = C - P + 2$ b) $F = C - P + 1$
   c) $F = C - P - 2$ d) $F = C - P - 1$

2) $(\partial H/\partial T)_T = V - T(\partial V/\partial T)_P$this equation is _____.
   a) first law of thermodynamics.
   b) Combined form of first and second law.
   c) thermodynamic equation of state.
   d) Maxwell relation.

3) Who among the following, assigned a wave function to all quantum objects?
   a) Planck b) de Broglie
   c) Einstein d) Schrodinger

4) The ejection of the electrons from the surface of a metal by exposing it with Visible or ultraviolet electromagnetic radiation is referred as _____.
   a) Compton effect b) Rayleigh effect
   c) Photoelectric effect d) Zeeman effect

5) The value of Maxwell- Boltzmann constant 'β' is given by _____.
   a) kT b) $1/kT$
   c) $1/k$ d) kT^2

6) Which of the following particle/object will possess considerable wavelength?
   a) a tennis ball b) a cricket ball
   c) an electron d) a football

7) Which of the following substance will have highest entropy?
   a) solid b) liquid
   c) gas d) semi solid

8) Raoult's law is obeyed by _____.
   a) real solutions b) non ideal solutions
   c) ideal solutions d) all of these

9) The individual way of distribution of energy in the particular configuration is called as _____.
   a) microstate b) configuration
   c) ensemble d) most probable configuration

10) Which of the following thermodynamic function is not state function?
   a) work b) heat
   c) entropy d) Both (a) and (b)

B) Fill in the blanks OR Write True/False. **06**

1) In dilute solution the behaviour of the solvent approaches that required by Raoult's law. (True/False)
2) The different energy levels having same energy are referred as ____. Degenerate/non- degenerate.
3) The residual entropy of a substance at absolute zero temperature is always non zero. (True/False)
4) Bohr atomic model is applicable for only one electron system. (True/False)
5) The most probable configuration is that configuration which has lowest microstates. (True/False)
6) The expression for Boltzmann-Planck equation is _____.

Q.2 Answer the following.

a) Give the physical significance of entropy. **04**
b) Write on excess thermodynamic properties. **04**
c) Derive Maxwell's relations. **04**
d) Write a note on most probable configuration. **04**

Q.3 Answer the following.

a) Discuss the basic assumptions of particle in a box model. Write on utility of this model. **08**
b) State Maxwell-Boltzmann distribution law and give its physical significance. **08**

Q.4 Answer the following.

a) State Third law of thermodynamics. Explain how the absolute entropy is estimated using this law. **08**
b) What are ensembles? Mention different types of ensembles. Explain in detail grand canonical ensemble. **08**

Q.5 Answer the following.

a) What is black body? Give classical and quantum mechanical expression for black body radiation distribution. **08**
b) What are partial molar properties? Give the physical significance of partial molar property. **08**

Q.6 Answer the following.

a) Write Schrodinger wave equation for a particle in one dimensional box. Give energy expression. Construct energy level diagram for first five energy levels. **08**
b) Derive thermodynamic equation of state. **08**

Q.7 Answer the following.

a) Discuss the freezing point depression method for determination of activity coefficient. **08**
b) Discuss Duhem-Margules equation for a system consisting of a two component liquid solution. **08**

SLR-EF-10

Seat No.	

Set P

M.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY
Analytical Chemistry– I (MSC05108)

Day & Date: Thursday, 11-01-2024 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. (MCQ) **10**

1) _____ ICP is used to analyse samples in which of the following states.
   a) Solids b) Liquids
   c) Gases d) Solids and liquids

2) 0.12g+0.003g = _____ is result of the following calculation, reported to the correct number of significant figures.
   a) 0.123 g b) 0.12 g
   c) 0.1 g d) 0.0 g

3) Systematic errors occur due to _____.
   a) overuse of instruments
   b) careless usage of instruments
   c) both A and B
   d) human sight

4) If arithmetic mean is considered as average deviations then resultant measure is considered as _____.
   a) Close end deviation b) Variance deviation
   c) Mean deviation d) Mean absolute deviation

5) _____ of the following forms of electrochemistry seek to obtain condition for full polarization.
   a) Potentiometry b) Voltammetry
   c) Coulometry d) Electrogravimetry

6) _____ is the extension of files created in Ms-Word 97-2003
   a) Dot b) Doc
   c) Dom d) Txt

7) Measurement which is close to true value is _____.
   a) Accurate b) average
   c) precise d) Error

8) Liquid samples are introduced into the ICP/AAS spectrometer using _____ of the following.
   a) Curvette having glass windows
   b) Probe
   c) Nebulizer
   d) Laser ablation system

9) _____ of the following is the function of the chopper in Atomic Absorption Spectroscopy.
   a) To split the beam into two
   b) To break the steady light into a pulsating light
   c) To filter unwanted components
   d) To reduce the sample into atomic state

10) The amperometric method is considered to be more accurate than polarographic method due to _____.
   a) Less dependent upon the characteristics of the capillary and the supporting electrolyte
   b) More dependent upon the characteristics of the capillary and the supporting electrolyte
   c) Not dependent upon the characteristics of the capillary and the supporting electrolyte
   d) None of above

B) Fill in the blanks. **06**

1) In atomic absorption spectroscopy the most strongly absorbed light is called as _____ line
2) ICP is used to analyse samples in which of the following states _____.
3) _____ error the following is caused by careless handling.
4) Systematic errors can be removed by _____.
5) A character that is downward and smaller than the baseline is known as _____.
6) The electrode used in amperometric titration is _____.

Q.2 Answer the following **16**

a) Write a note about techniques of sampling gases and solids.
b) Give the quantitative application of polarography.
c) Explain Least square method.
d) Discuss the methods of minimization of error.

Q.3 Answer the following

a) What is error and explain average and standard deviation. **08**
b) Discuss the principles, instrumentation, nature of titration curves of polarography. **08**

Q.4 Answer the following

a) Discuss the principles and instrumentation of ICP. **08**
b) Discuss the detection limits and sensitivity, interference of atomic absorption spectroscopy. **08**

Q.5 Answer the following

a) What are electroanalytical techniques. Explain the amperometry principle and working. **08**
b) Discuss in detail the Ilkovic equation and its application in quantitative analysis. **08**

Q.6 Answer the following

a) Explain about software used as Origin, CHEM DRAW, CHEM SKETCH. **08**
b) Define precision and accuracy. Explain the Variance and Confidence Limit. **08**

Q.7 Answer the following

a) Explain in detail half wave potential of an electrolyte in polarography. **08**

b) Discuss the use of MS WORD, power point and excel in chemistry. **08**

SLR-EF-12

Seat No.	

Set P

M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY
Inorganic Chemistry - II (MSC05201)

Day & Date: Monday, 18-12-2023 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose Correct Alternative. **10**

1) Ionization energy of elements increases with _____.
   a) Increase in size
   b) Increase in nuclear attraction
   c) Both a and b
   d) None of the above

2) Which of the following noble gas elements forms Clathrates?
   a) He, Ne, Ar b) Ne, Ar, Kr
   c) Ar, Kr, Xe d) Kr, Xe, Ne

3) Following is true about Wilkinson's catalyst _____.
   a) Coordinatively saturated
   b) do not obey 18 electron rule
   c) Used for oxidation of alcohols
   d) is an Iridium (Ir) complex

4) In biological systems _____ metals are involved in the regulation of Osmotic pressure around a cell wall.
   a) Fe, Ca b) Mg, Al
   c) I, Na d) Na, K

5) The stability of Complexes decreases with _____.
   a) Increase in charge on metal ion
   b) Increase in size of ligand
   c) Chelating ligands
   d) All of the above

6) The total Magnetic moment shown by Lanthanides and Actinides is arises due to _____ of electron.
   a) only spin motion b) both spin and orbital motion
   c) only orbital motion d) none of the above

7) In Oxyhemoglobin, the Iron center best described by which of the following?
   a) High spin Fe(II) b) High spin Fe(III)
   c) Low spin Fe(III) d) Low spin Fe(II)

8) Pick out the correct statement about Calcination process.
   a) It removes moisture
   b) It removes volatile impurities
   c) It converts non-oxide ore to oxide ore
   d) All of the above

9) The Active catalyst involved in the Hydroformylation of olefins _____.
   a) $[RhI_2 (CO)_2]^-$ b) $[RhCl (PPh_3)_3]$
   c) $HCo (CO)_4$ d) $TiCl_4$, $AlEt_3$

10) Poling process is used for the purification of _____ metal.
   a) Zinc and Silver b) Copper and lead
   c) Tin and lead d) Copper and Tin

B) Write True or False / Fill in the blanks. **06**

1) Both Borazine and Benzene undergoes addition reaction.
   a) True b) False
2) Myoglobin consist of four Heme units.
   a) True b) False
3) The acid strength of oxoacids of any halogen increases with increase in number of oxygen atoms attached to central halogen atom.
   a) True b) False
4) Galena ore associated with silver is called as _____.
5) The Hapticity of C_5H_5 group in Ferrocene is _____.
6) The observed electronic configuration of Europium (Eu) is _____.

Q.2 Answer the following. **16**

a) Discuss the Polymorphism of Carbon.
b) Discuss the applications of Actinides.
c) Derive the relation between stepwise and overall stability constants.
d) Describe in Short Monsanto acetic acid process with the help of catalytic cycle.

Q.3 Answer the following.

a) Explain the Synthesis, properties and structure of Borazine. **08**
b) Explain in detail Wacker process with the help of catalytic cycle. **08**

Q.4 Answer the following.

a) Explain the factors affecting stability of metal complexes w.r.t. metal ion and ligand. **08**
b) Describe the Oxoacids of Halogens in detail. **08**

Q.5 Answer the following.

a) Explain in detail Ziegler - Natta polymerization and give its significance. **08**
b) Give the occurrence and explain in detail the metal extraction process of Copper. **08**

Q.6 Answer the following.

a) Discuss the Solvent extraction and Ion exchange separation method of Lanthanide elements. **08**
b) Describe the role of PS-I and PS-II in photosynthesis process. **08**

Q.7 Answer the following.

a) Explain in detail the preparation methods of transuranic elements. **08**
b) Give the Occurrence, Properties and Uses of Gold metal. **08**

SLR-EF-13

Seat No.	

Set P

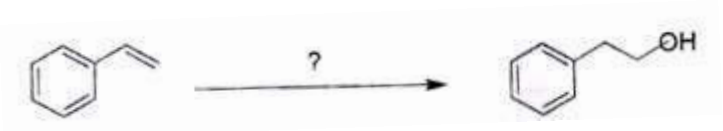
M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY
Organic Chemistry – II (MSC05202)

Day & Date: Tuesday, 19-12-2023 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. No. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

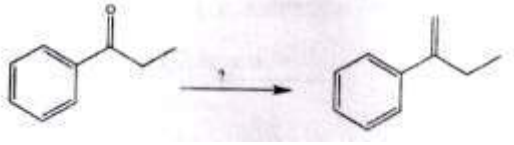
Q.1 A) Choose correct alternative. **10**

1) The reagent used to bring about the following conversion.



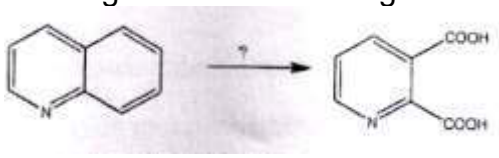
a) BH_3, H_2O_2/OH^- b) OsO_4
c) Alkaline $KMnO_4$ d) $LiAlH_4/H_2O$

2) Suggest the suitable reagent for the following transformation.



a) Me_3SiCH_3Li b) Me_3SiCH_2Li
c) $Me_3SiCH(CH_3)Li$ d) $Me_3SiPhLi$

3) Suggest the suitable reagent for the following transformation.

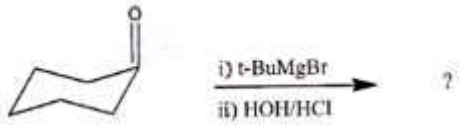


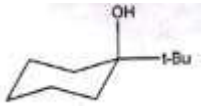
a) $KMnO_4$ b) H_2O_2
c) Lead tetra-acetate d) Osmium tetroxide

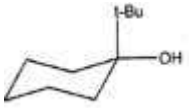
4) _____ reaction is useful and unique in its ability to accomplish the partial reduction of aromatic rings.
a) Clemmensonreduction b) Wolf Kishner reduction
c) Birch reduction d) All of these

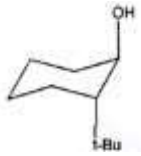
5) _____ is a very selective reducing agent for the reduction of aldehydes and ketones to alcohols.
a) $LiAlH_4$ b) Na and Liq. NH_3
c) Na in alcohol d) $NaBH_4$

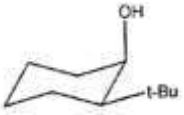
6) Predict the product for the following reaction.



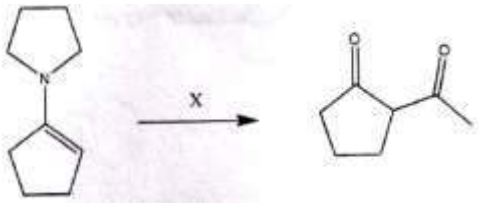
a) 

b) 

c) 

d) 

7) The reagent X in following reaction is _____.



a) CH_3-CO-CH_3 / H_3O^+ b) CH_3-CO-Cl / H_3O^+

c) CH_3-CO-OH / H_2O d) CH_3-CO-C_2H_5 / H_3O^+

8) Enamines are considered as _____ analogues of enolates.
   a) Nitrogen b) Sulphur
   c) Hydrogen d) Oxygen

9) _____ is most often used for syn-hydroxylation of alkenes.
   a) MnO_2 b) CrO_3
   c) H_2O_2 d) OsO_4

10) Betaine complex is formed in ____ reaction.
   a) Stobbe condensation b) Perkin
   c) Knovenagel d) Wittig

B) Fill in the blanks. **06**

1) Thalium nitrate is a versatile _____ agent.
2) _____ rule favours the formation of most substituted alkene.
3) _____ reaction can be used for the formation of C-C-N bond in organic synthesis.
4) A _____ reaction leads to the predominant formation of one of several possible stereoisomeric products.
5) DIBAL-H is a selective _____ agent.
6) Xanthate ester compounds undergoes _____ elimination reaction.

Q.2 Answer the following **16**

a) Using Friedel-Crafts reaction, how will you synthesize n-propylbenzene starting from benzene.

b) Both m-bromoanisole and o-bromoanisoe yield the same product m-anisidine, Explain why?

c) Describe the mechanism for Benzoin condensation reaction.

d) Give comparison between E1 and E2 reaction.

Q.3 Answer the following **16**

a) Write a detail note on Sharpless asymmetric epoxidation with suitable example.

b) Discuss in detail the pyrolysis of esters and its stereochemistry.

Q.4 Answer the following. **16**

a) Discuss aromatic nucleophilic substitution reaction via benzynes with example.

b) Explain orientation and reactivity in monosubstituted benzenes based on charge distribution.

Q.5 Answer the following **16**

a) Explain in detail ambient nucleophile and factors governing the regioselectivity in ambient nucleophiles.

b) Describe the mechanism and synthetic uses of Michael addition reaction.

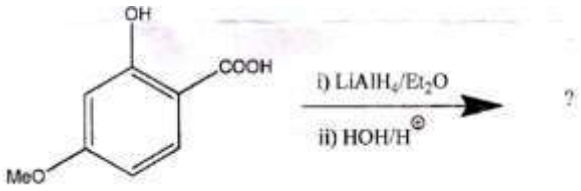
Q.6 Answer the following **16**

a) Give reaction, mechanism and synthetic applications of the following reagents:

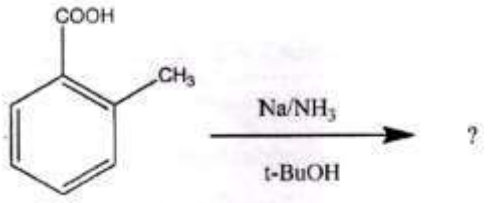
1) I_2/CH_3COOAg 2) OsO_4

b) Predict the products and give mechanism for the followings:

1)



2)



Q.7 Answer the following **16**

a) What is hydrogenolysis? Discuss the hydrogenolysis of amines, ehers, C-X bond and cyclopropane rings.

b) Discuss the oxidation reactions of alkenes and alkynes by using Thallium nitrate.

SLR-EF-14

Seat No.	

Set P

M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY
Physical Chemistry – II (MSC05206)

Day & Date: Wednesday, 20-12-2023 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q.1 and Q.2 are compulsory.
2) Figures to the right indicate full marks.
3) Attempt any three questions from Q. No. 3 to 7.

Q.1 A) Multiple choice Questions **10**

1) For singlet slate, the spin multiplicity is _____.
   a) 1 b) 2
   c) 0 d) 1/2

2) During recharging process of secondary cells electrons are absorbed by _____.
   a) Cathode b) Anode
   c) Electrolyte d) Both a & b

3) According to Debye-Huckel limiting law, $-\log f = \ldots\ldots z^2 \sqrt{\mu}$
   a) 0.55 b) 0.51
   c) 0.48 d) None of these

4) The major cause for ozone holes and its depletion is _____.
   a) CO_2 b) Water vapors
   c) Halocarbon refrigerants d) None of these

5) The _____ can be measured by the movement of electrophoresis.
   a) zeta resistance b) voltage
   c) current d) zeta potential

6) If one of the reactants is neutral molecule then, $Z_A . Z_B =$ _____.
   a) 0 b) 1
   c) 2 d) 3

7) The emission fluorescence intensity is always _____ shifted as compared to absorption spectra.
   a) Blue b) Red
   c) Green d) All of these

8) Steady state approximation is applied to the complex or chain reactions wherein rate determining step is _____.
   a) Obvious b) Not obvious
   c) Faster d) None of these

9) In secondary batteries, redox reaction is _____.
   a) Slow b) Reversible
   c) Irreversible d) Not present

10) Molecularity of a chemical reaction never be _____.
   a) zero b) Integer
   c) Half integer d) All of these

B) Write True/False. **06**

1) In ground state, molecule likely to occur in second vibrational level.
2) Electron withdrawing substituent tends to enhance the fluorescence intensity.
3) In alkaline batteries, electrolyte is KOH.
4) Electro-osmosis is the motion of dispersed particles relative to a fluid under the influence of a spatially uniform electric field.
5) E-type delayed fluorescence is first time observed in eosin.
6) Batteries of TV remote control are consisting of primary cells.

Q.2 Answer the following. **16**

a) Describe Franck-Condon principle in brief.
b) Give the construction of Lead-acid battery.
c) State the difference between the fluorescence, phosphorescence and delayed fluorescence.
d) Write a short note on steady-state approximation.

Q.3 Answer the following.

a) Illustrate the influence of ionic strength on the rates of ionic reactions **10**
b) Write a detailed note on green house effect. **06**

Q.4 Answer the following.

a) Define excimer and exciplex. Explain mechanism of formation and emission of excimer with the help of suitable example. **08**
b) Derive the rate law for a reaction between H_2 and Br_2. **08**

Q.5 Answer the following.

a) Define delayed fluorescence. Describe the various types of delayed fluorescence and their emission mechanism in detail. **08**
b) Give the details of various theories of electric double layer. **08**

Q.6 Answer the following.

a) Write a brief note on photo-oxidation and photo-reduction phenomena. **08**
b) Explain various photo-physical processes with the help of Jablonski diagram. **08**

Q.7 Answer the following.

a) How to evaluate the dissociation constant for weak acid from emf measurements. **06**
b) Derive the rate laws for decomposition of ethane and ozone by using SSA concept. **10**

SLR-EF-16

Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
ORGANIC CHEMISTRY
Advanced Organic Chemistry – I (MSC07301)

Day & Date: Friday, 05-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

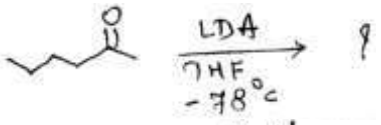
1) _____ can be used to prepare alkene by way of the α-metallo derivatives in Julia Olefination reaction.
   a) Diols b) Alkyl halides
   c) Sulfones d) All three

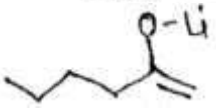
2) In Brook rearrangement migration of silyl group is _____.
   a) intramolecular b) from carbon to oxygen
   c) 1,2 - anionic d) All three

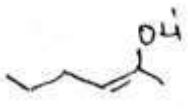
3) The first step of Eschenmoser fragmentation reaction is condensation between _____ and _____.
   a) ketone, aryl sulfonyl hydrazine
   b) aldehyde, aryl sulfonyl hydrazine
   c) α, β- epoxy ketone, aryl- sulfonyl hydrazine
   d) ketone, hydrazine

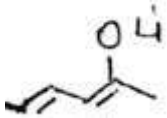
4) In the Wolff rearrangement _____ is formed as an intermediate.
   a) ketene b) nitrene
   c) isocyanate d) carbene

5) Enolates are _____ and ketones are _____, therefore there is a potential problem of self condensation.
   a) neutral, acidic b) acidic, neutral
   c) electrophiles, nucleophiles d) nucleophiles, electrophiles

6) 

   a) 

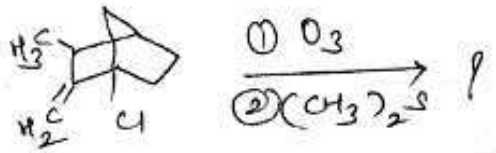
   b) 

   c) 

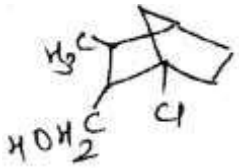
   d) All three

7) SeO_2 oxidizes _____ group to _____ group.
   a) methyl, aldehyde b) methylene, ketone
   c) methyl, ketone d) both a & b

8)



a)



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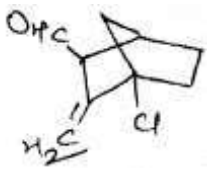

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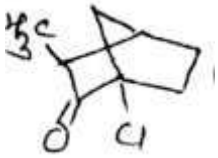

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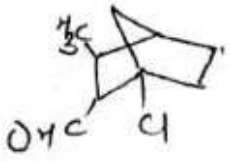
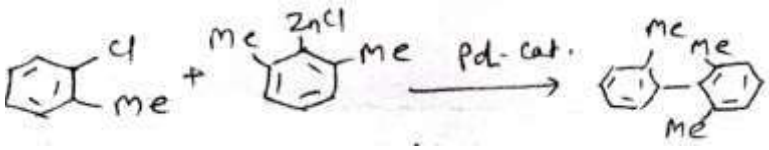


9) Periodic acid is useful in the structure determination of _____.

a) 1,2- glycols
b) carbohydrates
c) alkanes
d) both a & b

10)

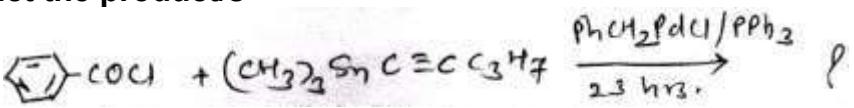


The above reaction is an example of _____ reaction.

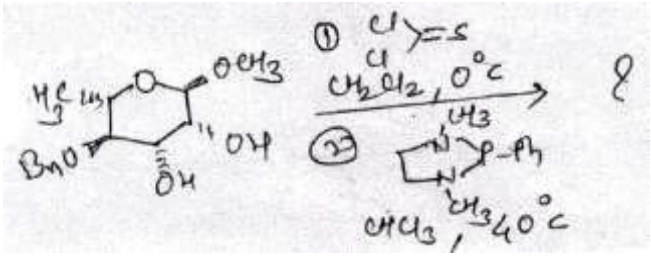
a) Kumada
b) Suzuki
c) Negishi
d) Hiyama

B) Predict the product/s **06**

1)



2)



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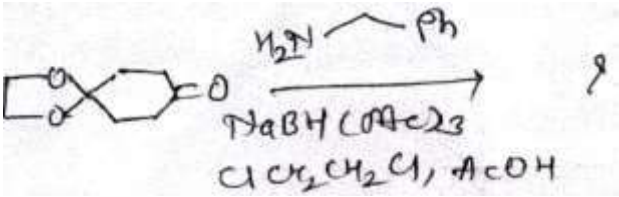

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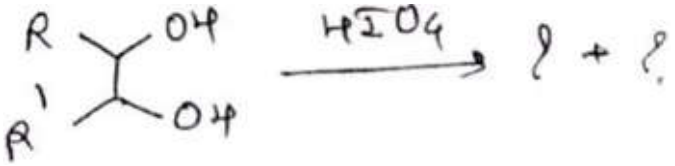
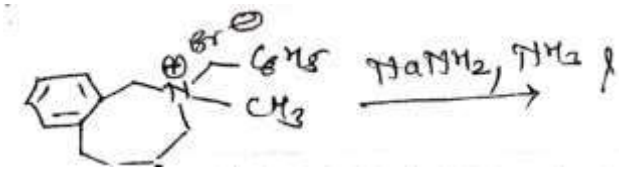
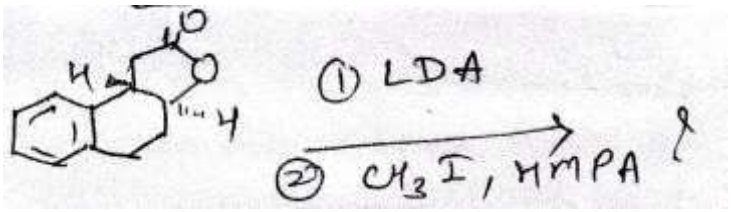


5)



6) 

Q.2 Answer the following. **16**

a) Explain the mechanism of Julia olefination with suitable example.
b) Explain reaction mechanism of Wolff rearrangement with suitable example.
c) Give the synthetize application of selenium dioxide.
d) Explain with suitable example alkylation of highly stabilized enolates.

Q.3 Answer the following

a) Discuss different applications of lithium dialkyl cuprate. **08**
b) Explain reaction mechanism and stereochemistry of Iodolactonization reaction and give its applications. **08**

Q.4 Answer the following

a) Explain alkylation of enolates stabilizes by two functional group and synthesis by decarboxylation of malonates & β- di carbonyl compound. **08**
b) Explain with suitable examples generation of specific enolates by different method other than deprotonation method. **08**

Q.5 Answer the following

a) Explain application and reaction mechanism of DCC as a reagent. **08**
b) Give reaction mechanism and applications of Heck reaction. **08**

Q.6 Answer the following

a) Discuss reaction mechanism and application of Payne rearrangement reaction. **08**
b) Discuss reaction mechanism and applications of Strecker amino acid synthesis. **08**

Q.7 Answer the following

a) Discuss application and reaction mechanism of iodoisobenzyl diacetate. **08**
b) Disuses intramolecular alkylation of enolates and alkylation of enamines. **08**

SLR-EF-17

Seat No.	

Set P

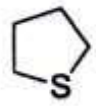
M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
ORGANIC CHEMISTRY
Chemistry of Bioactive Heterocycles (MSC07302)

Day & Date: Sunday, 07-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Question Nos.1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

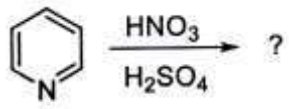
Q.1 A) Choose correct alternative (MCQ). **10**

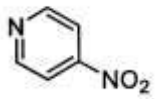
1) The IUPAC nomenclature for the given heterocycle is _____.

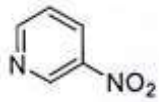


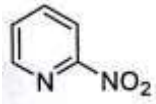
a) Thiaolane b) Thiolane
c) Thiaetane d) Thietane

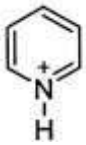
2) The major product formed in the following reaction is:



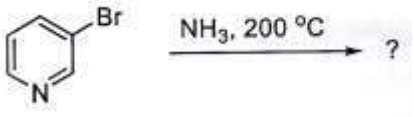
a) 

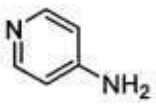
b) 

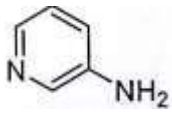
c) 

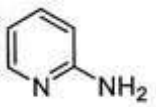
d) 

3) The major product formed in the following reaction is _____.



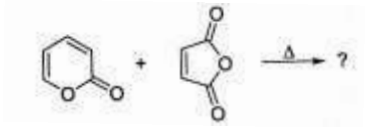
a) 

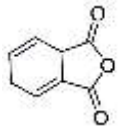
b) 

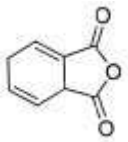
c) 

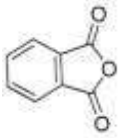
d) No reaction

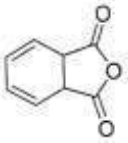
4) The major product formed in the following reaction is:



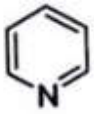
a) 

b) 

c) 

d) 

5) Which compound is least basic?

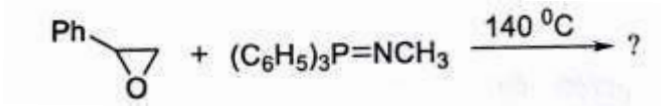
a) 

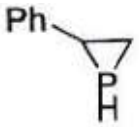
b) 

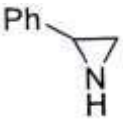
c) 

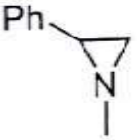
d) 

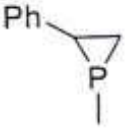
6) Predict the product of following reaction



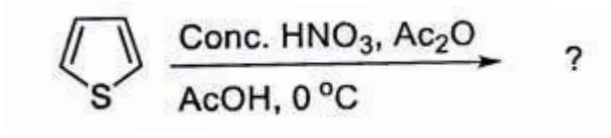
a) 

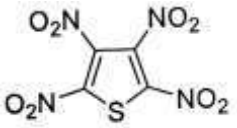
b) 

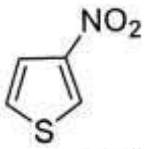
c) 

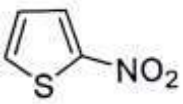
d) 

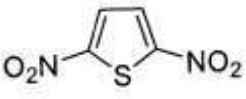
7) The major product formed in the following reaction is:



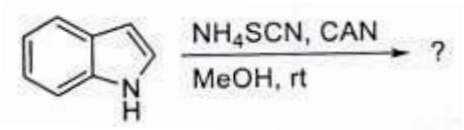
a) 

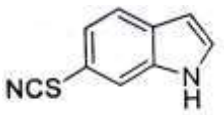
b) 

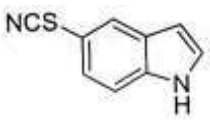
c) 

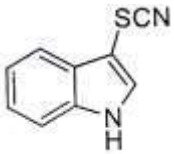
d) 

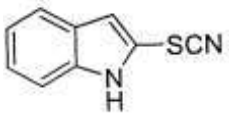
8) Which is the most probable main product of the following reaction?



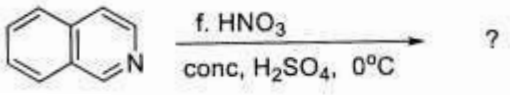
a) 

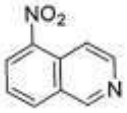
b) 

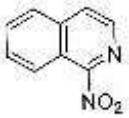
c) 

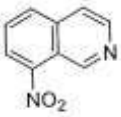
d) 

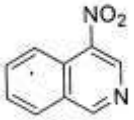
9) Which is the major product of the following reaction?



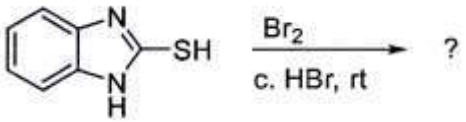
a) 

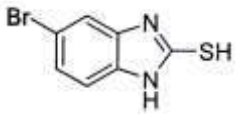
b) 

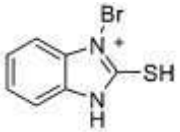
c) 

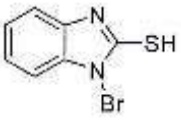
d) 

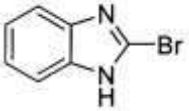
10) Which is the most probable main product of the following reaction?



a) 

b) 

c) 

d) 

B) True or False. **06**

1) Furan is more reactive towards electrophile than pyrrole.
2) Pyridine is less basic than imidazole.
3) Indole is less reactive towards electrophile than pyridine.
4) Thiophene is more resonance stabilized than furan.
5) Aza is the prefix used for oxygen containing heterocycles.
6) IUPAC system is also known as Trivial system.

Q.2 Answer the following. **16**

a) Write a short note on synthesis of Tetrazine.
b) Discuss the two methods for synthesis of aziridines.
c) How to prepare pyridones from 1,3-dicarbonyl compounds? Discuss in details with mechanism.
d) What are the methods for synthesis of coumarins? Discuss with mechanism.

Q.3 Answer the following.

a) Discuss with mechanism the Paul-Knorr synthesis of furan and pyrrole. **08**

b) What are the various methods for synthesis of benzimidazoles and benzothiazoles? **08**

Q.4 Answer the following.

a) What is the reactivity of pyridine towards electrophilic substitution reaction with regioselectivity? **08**

b) What are Skraup synthesis and Doebner-Miller synthesis reactions? Discuss with examples and mechanism. **08**

Q.5 Answer the following.

a) What are Baldwin Rules? Discuss in Details. **08**

b) Write two methods of each for synthesis of thiazole and isothiazole. **08**

Q.6 Answer the following.

a) At which positions do indole and benzothiophene reacts most readily with electrophiles? Give reason of each. **08**

b) What are the methods for synthesis of pyrimidine? Explain with examples. **08**

Q.7 Answer the following.

a) What are the methods for synthesis of imidazole and pyrazole? **08**

b) What is regioselectivity of bromination and nitration reactions in pyrrole with examples. **08**

SLR-EF-18

Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
ORGANIC CHEMISTRY
Photochemistry and Pericyclic Reactions (MSC07306)

Day & Date: Tuesday, 09-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) A reaction in which ring is closed or opened at the expense of a conjugated double or triple bond is called _____.
   a) Cycloaddition Reaction
   b) Sigmatropic Rearrangement
   c) Electrocyclic Reaction
   d) Group transfer Reaction

2) Thermal ring closure or opening reactions are allowed when ground state orbitals of reactant correlate with _____.
   a) Ground state orbitals of product
   b) First excited state of product
   c) Both a & b
   d) None of these

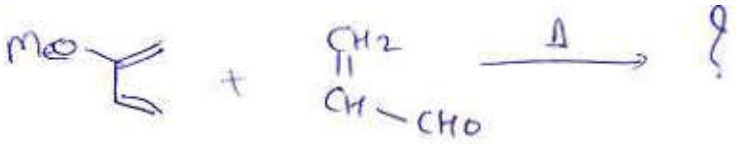
3) The following rearrangement belongs to which class of sigma tropic rearrangement.

   a) [1,3] b) [1,5]
   c) [1,7] d) [3,3]

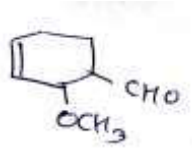
4) According to Huckel-Mobius rule, thermal reactions take place via _____.
   a) Antiaromatic transition state
   b) Aromatic transition state
   c) Non aromatic transition state
   d) None of above

5) Cycloaddition reactions taking place across same face of a π system is _____.
   a) Antrafacial b) Suprafacial
   c) Both a & b d) Neither a or b

6) Predict major product of following reactions.



a) 

b) 

c) 

d) All

7) Free radicals can be detected by _____.
   a) Electron spin resonance spectroscopy
   b) NMR spectroscopy
   c) Mass spectroscopy
   d) Raman spectroscopy

8) Electron poor alkenes on reaction with aromatic compound undergo cycloaddition to give _____.
   a) 1,2 - Addition Product
   b) 1,3 - Addition Product
   c) 1,4 - Addition Product
   d) All of above

9) Energy of E_1 orbital of benzene is _____.
   a) $\alpha + \beta$
   b) $\alpha - \beta$
   c) $\alpha - 2\beta$
   d) $\alpha + 2\beta$

10) Delocalization energy of a conjugated cyclic system is given by _____.
   a) $y\alpha + x2\beta$
   b) $x\ 2\alpha + y\beta$
   c) $x\alpha + y2\beta$
   d) $x + y\beta$

B) Write True or False. **06**

1) A thermal electrocyclic reaction is symmetry allowed when total number of $(4q+2)_s$ &$(4r)_\alpha$ component is odd.
2) [1,5] Sigmatropic rearrangement is photochemically allowed.
3) Thermally induced [2+2] cycloaddition reactions are symmetry forbidden reaction.
4) With NBS reagent of bromination takes place at β position of  group.
5) Only acyclic dienes can undergo Di-π methane rearrangement.
6) Naphthalene has more resonance energy than anthracene.

Q.2 Answer the following. **16**

a) Construct π MO diagram of 1,3 - butadiene.
b) With the help of Huckel - Mobius method, explain mechanism of Sigmatropic rearrangement.
c) Write note on Paterno - Buchi reaction.
d) Calculate energies of different molecular orbitals of benzene.

Q.3 Answer the following.

a) With the help of correlation diagram, explain electrocyclic ring opening of cyclobutene to 1,3 butadiene. **08**

b) Explain in detail stereochemistry and orientation effect in Diels Alder reaction. **08**

Q.4 a) Explain free radical substitution mechanism at Aliphatic & Aromatic substrate. **08**

b) Calculate delocalisation energy of following. **08**

i) Cyclopentadienyl radical
ii) Cyclopentadienyl anion
iii) Cyclopentadienyl cation & comment on their stability order.

Q.5 a) With the help of FMO method, explain mechanism of electrocyclic ring closure reactions. **08**

b) Explain in detail [1,3] and [1,5] Sigmatropic rearrangement. **08**

Q.6 a) Explain Norish Type - II cleavage in carbonyl compounds. **08**

b) Explain PMO theory in detail. **08**

Q.7 a) **Write short notes on.** **08**

i) Claisen rearrangement
ii) Ene reaction

b) Explain cycloreversion reaction. **08**

SLR-EF-20

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
Organic Chemistry
Advanced Organic Chemistry - II (MSC07401)

Day & Date: Monday, 18-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question 1 and 2 are compulsory.
2) Attempt any three questions from Q.3 to Q.7
3) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative. **10**

1) Which of the following compounds act as protecting group for amines?
   a) Carbamates b) BOC group
   c) Fmoc d) All of these

2) _____ reaction is a cross coupling reaction in which the organometallic component is aryl or vinyl boron compound.
   a) Suzuki coupling
   b) Wacker oxidation
   c) oxidative addition reaction
   d) Suzuki coupling

3) A group whose use makes possible to react a less reactive functional group selectively in the presence of a more reactive group is known as _____.
   a) FGI b) Protecting group
   c) Synthon d) Umpolung

4) Which of the following act as Umpolung reagent?
   a) 1,3-Dithianes b) Cyanide
   c) Nitro compounds d) All of these

5) An imaginary bond breaking corresponding to the reverse of real reaction is known as _____.
   a) FGI b) Disconnection
   c) Target Molecules d) None of these

6) The protecting group must not be _____
   a) Simple to put on
   b) Unstable to reaction conditions
   c) Easy to remove
   d) Stable to reaction condition

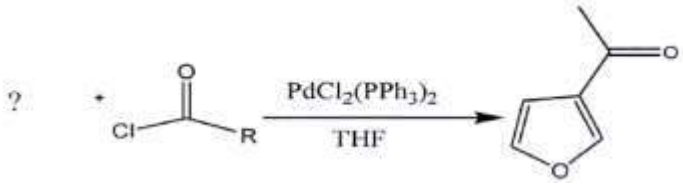
7) A real chemical compound (reagent) carrying out the function of a synthon is called _____.
   a) Synthetic equivalent b) FGI
   c) Target Molecules d) None of these

8) Pentacarbonyl ion can be reduced by sodium amalgam in THF to _____ which is good nucleophile.
   a) Metal carbonyl cation b) Metal carbonyl anion
   c) Metal d) Metal anion

9) Asymmetric boranes can be made which are used in enantioselective synthesis, the reagents of choice are prepared from (+) and (-) _____ and diborane.
   a) α-pinine b) β-pinine
   c) tannine d) Lactic acid

10) Oxidation of organoborane to _____ is usually effected with Alkaline H_2O_2.
   a) ethers b) acid
   c) alcohol d) aldehyde

B) Fill in the blanks. **06**

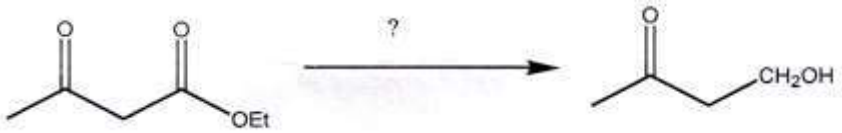
1) A reaction in which one functional group within a molecule reacts leaving other potentially reactive functional groups unaltered is called _____.
2) The situation in which a synthon of polarity opposite to that normally associated with the required functional group must be used is called _____.
3) Protecting group is introduced by treating the carbonyl compound in the presence of _____ with an alcohol, diol, thiol or dithiol.
4) _____ is cross coupling reaction in which the organometallic compound is alkenyltrialkyl or alkynyltrialkyl stannane.
5) 

6) Trialkyl boranes react with _____ in the presence of diglyme to give R_3CBO.

Q.2 Answer the following. **16**

a) Write a note on protection of amine with Fmoc-Cl and tBOC-Cl with suitable example.

b) Using suitable protecting group how would you bring about the following conversion?



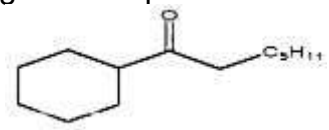
c) Explain guidelines for disconnection.

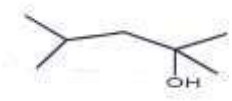
d) Define and explain:
   i) Umpolung ii) Retrosynthetic analysis

Q.3 Answer the following. **16**

a) What are protections? Discuss the protection of carbonyl compounds by suitable reagents and give its applications.

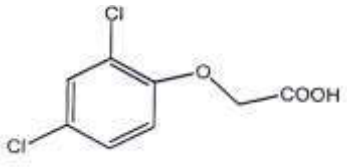
b) Based on the disconnection approach suggest a convenient synthesis for the given compounds.

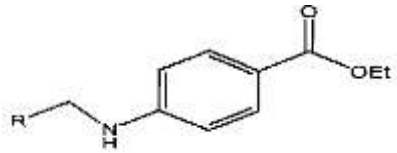
i) 

ii) 

Q.4 Answer the following. **16**

a) Give the synthon and synthetic equivalent for the following T.M.

i) 

ii) 

b) Explain Pauson Khand Reaction in detail.

Q.5 Answer the following. **16**

a) Write a note on cross coupling reactions give its general mechanism and Explain Suzuki coupling reaction in detail.

b) Write a note on preparation of aldehyde and ketone from organoborane.

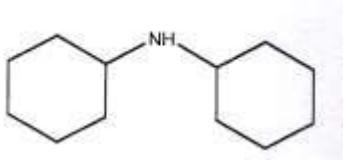
Q.6 Answer the following. **16**

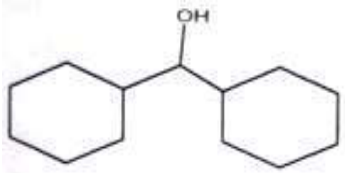
a) Explain Wacker oxidation.

b) Explain the role of organoboranes in organic synthesis.

Q.7 Answer the following. **16**

a) Outline the retrosynthetic analysis and design the synthesis for the following target molecules.

i) 

ii) 

b) Explain the role of $(Ipc)BH_2$ and $(Ipc)_2BH$ in organic synthesis.

SLR-EF-21

Seat No.	

Set P

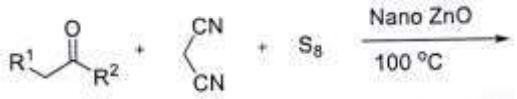
M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
ORGANIC CHEMISTRY
Modern Organic Chemistry (MSC07402)

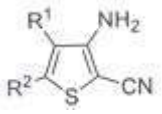
Day & Date: Tuesday, 19-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

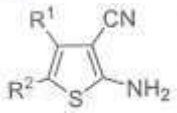
Instructions: 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

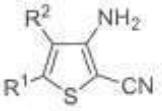
Q.1 A) Choose the correct alternative. **10**

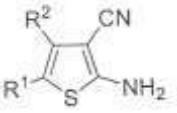
1) Predict the product of the following reaction



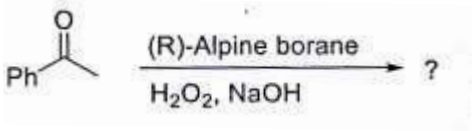
a) 

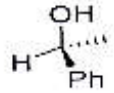
b) 

c) 

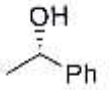
d) 

2) Predict the correct option of a major product.



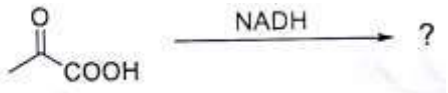
a) 

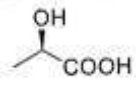
b) 

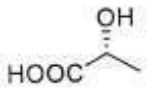
c) 

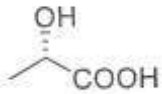
d) Both (a) and (c)

3) Predict the correct option of major product.



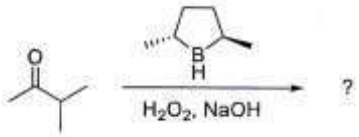
a) 

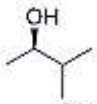
b) 

c) 

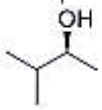
d) Both (a) and (b)

4) Predict the correct option of major product.



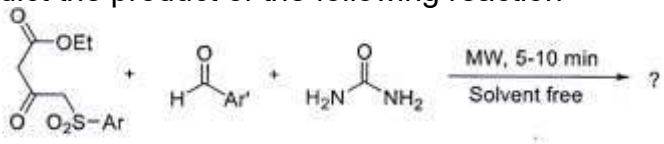
a) 

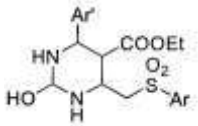
b) 

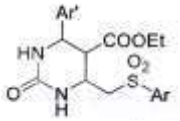
c) 

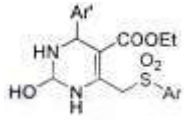
d) Both (b) and (c)

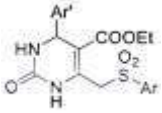
5) Predict the product of the following reaction



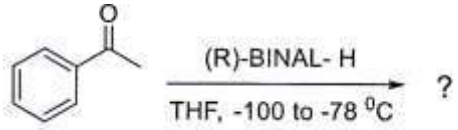
a) 

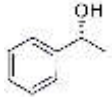
b) 

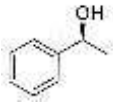
c) 

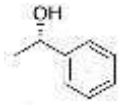
d) 

6) In the following transformation, the correct option is _____



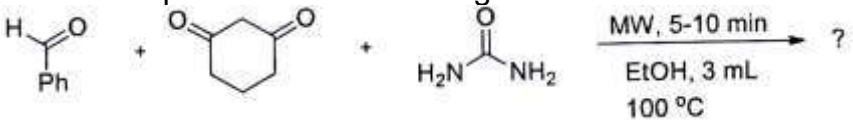
a) 

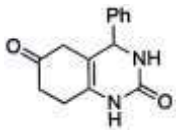
b) 

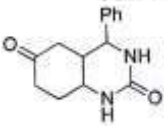
c) 

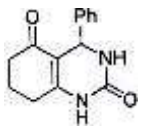
d) Both (a) and (c)

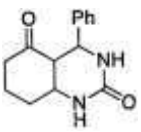
7) Predict the product of the following reaction



a) 

b) 

c) 

d) 

8) The MOFs which are hard to synthesize by traditional routes, are synthesized by _____ method.

a) Ultrasound
b) Solvo-thermal
c) Crystal transformation
d) Microwave

9) In MOF-5, metal node is _____.
   a) Fe b) Ti
   c) Zn d) Cu

10) According to computational fitting results surface area of MOFs could probably reach up to _____.
   a) 15600 m^2/g b) 14800 m^2/g
   c) 7140 m^2/g d) 7040 m^2/g

B) Fill in the blanks. **06**

1) The chiral reagent approach for asymmetric synthesis always gives product with 100% ee.
2) The poly-substituted 2-amino-thiophene is the product of Gewald reaction.
3) The epoxidation reaction is not stereospecific reaction.
4) Those reactions including three and more starting materials are classified as one pot reactions.
5) An increase in the number of benzene rings in organic linker could not affect the pore size of metal organic frameworks.
6) The pore size of mesoporous materials ranges more than 50 Å.

Q.2 Answer the following. **16**

a) Define stereospecific reaction? Why addition of bromine and electrophilic epoxidation with alkene are diastereospecific?

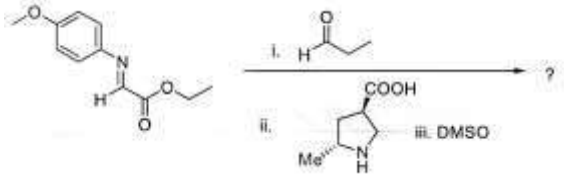
b) Write the product of the following Strecker MCR with mechanism.

c) Write a note on analysis methods of MOF.

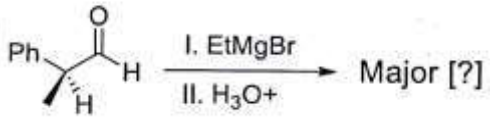
d) Write a short note on Enantiomeric excess?

Q.3 Answer the following.

a) Predict the major product and give justification for diastereoselectivity with mechanism in following transformation? **08**

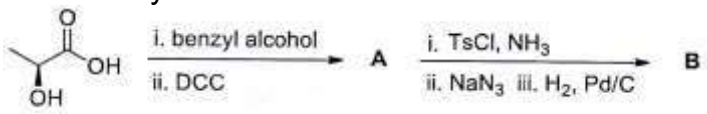


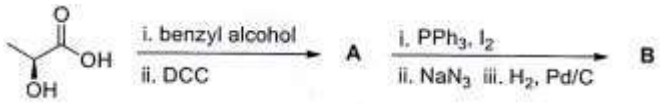
b) What is Felkin Ahn Model? Discuss in details and give justification for the major product of following reaction. **08**



Q.4 Answer the following.

a) Define chiral Pool? Explain the following transformation with stereochemistry. **08**

i) 

ii) 

b) How MCRs are useful for synthesis of heterocycles using Knoevenagel reaction? **08**

Q.5 Answer the following.

a) What are the functionalized MOFs? Explain in detail the methods involved in MOF Functionalization. **08**

b) What are the synthetic routes to metal organic frameworks? Explain solvo-thermal and solid-state methods of MOF synthesis with suitable diagram. **08**

Q.6 Answer the following.

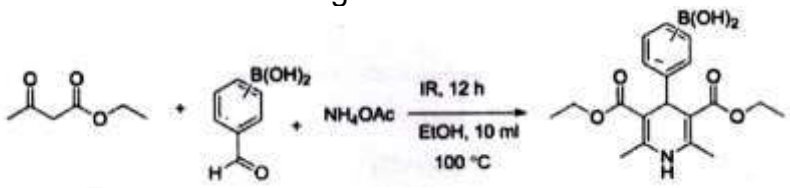
a) How SAMP/RAMP chiral auxiliary useful in the asymmetric synthesis? Discuss their applications in enantioselective synthesis. **08**

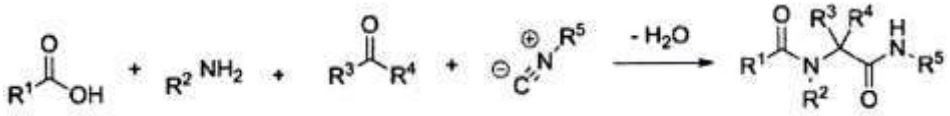
b) Define chiral catalyst? What is Sharpless epoxidation? Comment on the stereoselectivity with examples. **08**

Q.7 Answer the following.

a) Write mechanism of Ugi and Gewald reaction? Write different applications of each. **08**

b) Write the mechanism of following reactions. **08**

i) 

ii) 

SLR-EF-22

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
ORGANIC CHEMISTRY
Chemistry of Natural Products (MSC07403)

Day & Date: Wednesday, 20-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

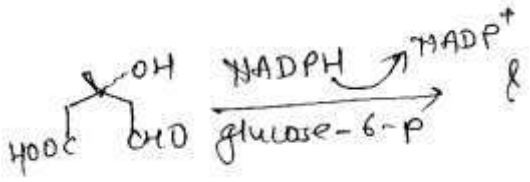
Q.1 A) Choose the correct alternatives. **10**

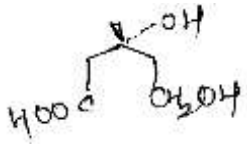
1) _____ is a pentacyclic quinoline alkaloid.
   a) Camptothecin b) Hardwickiic acid
   c) Podophyllo toxin d) Mifepristone

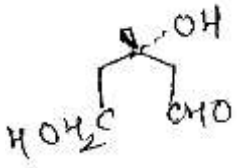
2) When strychnine is heated with _____ given deep purple colour.
   a) Potassium dichromate
   b) Potassium permanganate
   c) 80% H_2SO_4 & a crystal of potassium dichromate
   d) 80 % H_2SO_4

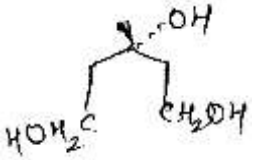
3) Prostaglandins are biosynthesised from _____.
   a) polysaturated fatty acids
   b) fatty acids
   c) polyunsaturated fatty acids
   d) unsaturated carboxylic acids

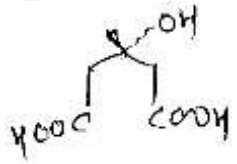
4)



a) 

b) 

c) 

d) 

5) Progesterone contains _____ group is confirmed by haloform test.
   a) -CO b) -COOH
   c) CH_3CO- d) >NH

6) The hydroxy group of oestrone is _____ in nature.
   a) pri. alcoholic b) sec. alcoholic
   c) alylic alcaholic d) phenolic

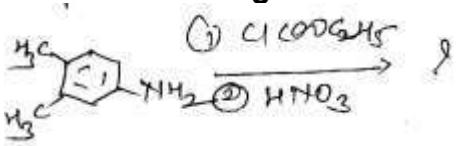
7) For the reactions in involving thiamine pyrophosphate, the site of action is ____ of the thiazole ring.
   a) N b) S
   c) C-5 d) C-2

8) _____ is supplied from food as well as intestinal bacteria.
   a) Vit H b) Vit B_2
   c) Vit B_6 d) Vit B_g

9) The two chair conformation of trans - decalin has a ____ of symmetry and is achiral.
   a) axis b) Centre
   c) alternating axis d) All three

10) Podophyllotoxin is used as _____ agents.
   a) antitumor b) anthelminthic
   c) antiviral d) All three

B) Complete the following reactions. **06**

1)


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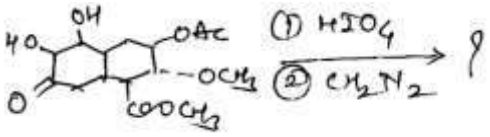

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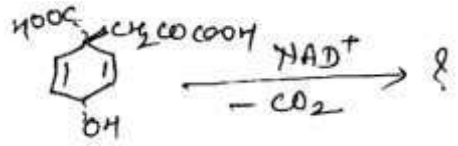

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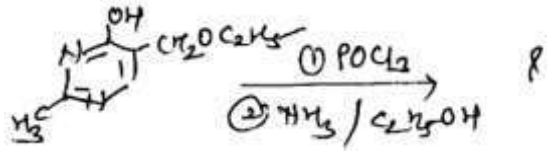

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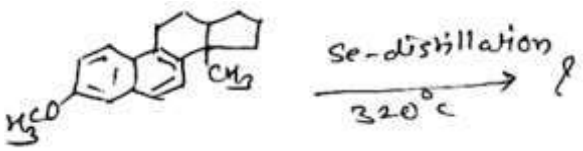

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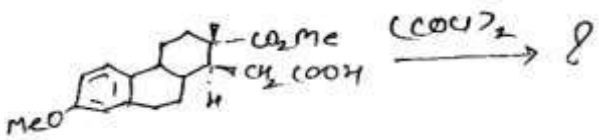


Q.2 Answer the following. **16**

a) Discuss the nature of nitrogen atoms and oxygen atoms in strychnine.
b) Discuss the constitution of testosterone.
c) Discuss the biosynthesis of gramine from tryptophan.
d) Discuss the biological functions of thiamine.

Q.3 Answer the following.

a) Draw the conformers of as and trans decline as and trans g-Methyl decalin and discuss their stabilities. **08**

b) Explain the synthesis of biotin and discuss its biochemical role. **08**

Q.4 Answer the following.

a) Discuss the structure elucidation and synthesis of progesterone. **08**

b) Give the synthesis of taxon. **08**

Q.5 Answer the following.

a) Discuss the biosynthesis of tropane, indole and quinidine group alkaloids. **08**

b) Discuss the synthesis of reserpine. **08**

Q.6 Answer the following.

a) Discuss the synthesis of prostaglandins. **08**

b) Discuss the biosynthesis of di, tri and tetraterpenoids. **08**

Q.7 Answer the following.

a) Discuss the nomenclature of steroids. **08**

b) Discuss the synthesis of strychnine. **08**

SLR-EF-23

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
ORGANIC CHEMISTRY
Medicinal Chemistry (MSC07408)

Day & Date: Thursday, 21-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) The major route of elimination of the volatile general anaesthetics is via _____.
   a) Kidneys b) Skin
   c) Lungs d) Liver

2) Monoamine reuptake inhibitor is mechanism of action of which of the following drugs.
   a) Phenelzine b) Tranylcypromine
   c) Fluoxetine d) Paroxetine

3) _____ is the brand name of acyclovir drug.
   a) Zopirax b) Mopirax
   c) Lopirax d) Zovirax

4) Which one of the following does not contain the piperidine moiety in the structure _____.
   a) Mepivacaine b) Cyclomethycaine
   c) Lidocaine d) Bupivacaine

5) Which one of the following belongs to imidazolidine-2,4-dione class.
   a) Phenytoin b) Trimethadione
   c) Phensuximide d) Paramethadione

6) Captopril is used as an _____drug.
   a) Antidepressant b) Antineoplastic
   c) Antihistamine d) Antihypertensive

7) Ibuprofen drug is fairly comparable to _____.
   a) Aspirin b) Cetrizine
   c) Phenelzine d) Cefixime

8) Class of carbamazepine is _____.
   a) Benzodiazepine b) Succinimides
   c) Barbiturates d) Iminostillbenes

9) Chloroquine is _____.
   a) Luminal amoebicide b) Systemic amoebicide
   c) Mixed amoebicide d) Oral amoebicide

10) Indomethacin is _____.
   a) Less acidic b) Optically active
   c) Selective to COX-II d) Producer of gastric ulcer

B) True or False **06**

1) The cephalosporins are beta-lactam antibiotics.
2) Halothane and Thiopental are antidepressant drugs.
3) Antineoplastics easily develop resistance.
4) Therapeutic remdesivir treatment has a clear clinical benefit in SARS-Cov-2 infected rhesus monkeys.
5) Glipizide is used to treat fungal medication.
6) Chloramphenicol is obtained from streptomyces capreolus.

Q.2 Answer the following **16**

a) Explain the mechanism of action of Cephalosporins.
b) Explain classification of Antifungal drugs.
c) Explain the synthesis of Propranolol.
d) Explain the antibiotic activity of Penicillins.

Q.3 Answer the following

a) Explain the SAR and mechanism of action of Tetracycline. **08**
b) Explain the SAR and synthesis of Paracetamol. **08**

Q.4 Answer the following

a) Explain the synthesis and mechanism of action of Chloroquine. **08**
b) Explain synthesis and mechanism of action of Ampicillin. **08**

Q.5 Answer the following

a) Explain classification and mechanism of action of Antibiotics. **08**
b) Explain the synthesis and mechanism of action of Phenytoin. **08**

Q.6 Answer the following

a) Explain the SAR and mechanism of action of Phenobarbital. **08**
b) Explain the SAR and synthesis of Phenelzine. **08**

Q.7 Answer the following

a) Explain antidiabetic activity of Insulin & Glipizide. **08**
b) Explain SAR and synthesis of Diphenlhydramine. **08**

SLR-EF-25

Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
INDUSTRIAL CHEMISTRY
Unit operations of chemical Engineering (MSC06301)

Day & Date: Friday, 05-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Multiple choice Questions **10**

1) Separation of sugar from sugar beets using hot water is a _____.
   a) Extraction b) Leaching
   c) Distillation d) Evaporation

2) In Continuous Decantation process, solid to be leached and solvent travels _____.
   a) Counter current b) Parallel
   c) Anticlockwise d) clockwise

3) In constant rate filtration:
   a) ΔP is minimum at start and maximum at the end of filtration run.
   b) ΔP is constant throughout the run.
   c) ΔP is maximum at start and minimum at the end.
   d) All of the above

4) The function of spiral agitator in 4. Swenson-Walker is to _____.
   a) Prevent the accumulation of the crystal on cooling surface.
   b) Accumulate crystal on cooling surface.
   c) Increase the rate of crystallization.
   d) Increase the rate of cooling.

5) Distribution of two separate phases randomly through one another is called _____.
   a) Mixing b) Agitation
   c) Crushing d) Conveying

6) Which of the following is a revolving screen?
   a) Trommel b) grizzly
   c) shaking screen d) All of these

7) Induced distribution of two separate phases through one another is called _____.
   a) Mixing b) Agitation
   c) Crushing d) Conveying

8) Tray Dryer consist of the following _____.
   a) is a batch operated direct dryer
   b) consists of an enclosed insulated cabinet
   c) A heating coil either electrical or steam-heating
   d) All of the above

9) Certain hydrated crystalline salts when exposed to the atmosphere at ordinary temperature lose their water of crystallization molecule either partially or completely and become anhydrous are called as _____.
   a) Hygroscopic substances
   b) Crystal Hydrate
   c) Solvates
   d) Efflorescence

10) _____ is not a minimum boiling azeotrope is:
   a) Chloroform- Acetone
   b) Ethanol- Acetone
   c) Carbon Disulphide- Acetone
   d) 95.5 % ethyl alcohol and 4.5 % water

B) Write True / False **06**

1) Filter aids used in filtration should be Chemically inert.
2) Crystallization involves Only mass transfer.
3) On adding acetone to methanol some of the hydrogen bonds between methanol molecules break and it form maximum boiling azetropes.
4) A propeller is an axial-flow impeller.
5) Tray dryer is commonly used for wet filter cakes and wet lumpy solids.
6) In the Dodge jaw crusher, the movable jaw is pivoted at the bottom.

Q.2 Answer the following **16**

1) What is volume and Longitudinal Strain?
2) What are different method of supersaturation? Explain Supersaturation achieved by evaporation.
3) Explain Horizontal tube evaporator.
4) Explain working of Dorr agitator with neat labelled diagram.

Q.3 Answer the following

a) Explain with schematic diagram Centrifugal filter. **08**
b) Draw neat labeled sketch and explain working of gyratory crusher. **08**

Q.4 Answer the following

a) Explain with schematic diagram working of Internal floating head heat exchanger. **08**
b) Discuss Sieve and valve plate used in distillation column. **08**

Q.5 Answer the following

a) Explain with flow sheet the process of Extractive Distillation. **08**
b) Explain with neat labeled diagram multiple effect evaporator. **08**

Q.6 Answer the following

a) Discuss construction and working of Vacuum crystallizer. **08**
b) Explain with schematic diagram Stress-Strain relationship. **08**

Q.7 Answer the following

a) Draw schematic diagram of Pulse column and explain operation process. **08**
b) Draw neat labeled sketch and explain working of Rotocel Extractor. **08**

SLR-EF-26

Seat No.		Set	P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
INDUSTRIAL CHEMISTRY
Unit processes in Chemical technology (MSC06302)

Day & Date: Sunday, 07-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any Three questions from Q.No.3 to Q.No.7.
3) Figures to the right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) How is sodium or potassium xanthate purified?
   a) Distillation b) Recrystallization
   c) Evaporation d) All of the mentioned

2) Dimethyl terephthalate is obtained by esterification of what?
   a) Benzene b) Ethanol
   c) Terephthalic acid d) phthalic acid

3) What is the disadvantage of bulk polymerization?
   a) High temperature b) Heat control
   c) Need catalyst d) All of the mentioned

4) Which of the following is an active center in initiating systems?
   a) Free radicals b) Carbonium ions
   c) Carbanions d) All of the mentioned

5) What happens to the rate of reaction as reflux ratio increases?
   a) Increases b) Decreases
   c) No change d) None of the mentioned

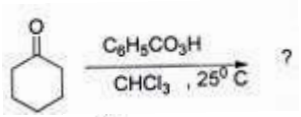
6) The formation of acetic acid through oxidation is done in which phase?
   a) Vapour b) Liquid
   c) Solid d) All of the mentioned

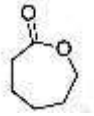
7) When a large volume is there, what type of reactor is used?
   a) Tubular reactor b) Simple batch reactor
   c) Semi batch reactor d) Tower reactor

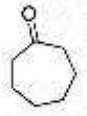
8) Which process is used to produce desired isomer in Naphthalene series?
   a) Sulfonation b) Desulfonation
   c) Alkylation d) Halogenation

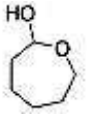
9) A mixture of amyl nitrite and ethyl alcohol produces what?
   a) Nitrile b) Nitrosamine
   c) Nitro ethyl alcohol d) Ethyl nitrite

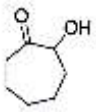
10) Predict the product



a) 

b) 

c) 

d) 

B) Write true/false OR fill in the blanks. **06**

1) When benzyl chloride is treated with sodium acetate it produces sodium benzyl.
   a) True b) False
2) While decreasing the D.V.S value the stability also decreases
   a) True b) False
3) Electron accepting kind of substituent groups should be attached to the monomer, for readily undergoing anionic polymerization.
   a) True b) False
4) _____ salt of soaps are used for the manufacture of lubricating greases.
5) The higher-molecular-weight aliphatic hydrocarbons, oxidizing _____ readily.
6) Hydrogen peroxide oxidizes _____ types of organic compounds.

Q.2 Answer the following. **16**

a) Describe in brief the desulphonation.
b) Discuss in brief Acrylonitrile polymers.
c) Give the relationship between D.V.S. and Stablity of Nitrator Charge.
d) Discuss the esterification by organic acid.

Q.3 Answer the following.

a) How is urea and melamine polymer prepared? What its properties and applications? **08**
b) Describe in detail the manufacturing process of vinyl acetate. **08**

Q.4 Answer the following.

a) Discuss in detail the use of N, N- DicycloHexylcarbodimide with respect to Acetic acid, also summarize the steriochemical aspect. **08**
b) Discuss the Favorski Rearrangement, Mechanism with respect to α-Chloro Cyclohexanonein presence of alkoxide as base. **08**

Q.5 Answer the following.

a) Explain with the diagram the manufacturing process of mono sulfonation of benzene. **08**
b) Discuss with labeled diagram. **08**
   1) Schmid nitrator and
   2) Biazzi nitrator

Q.6 Answer the following.

a)	Explain in details various types of chemical reactor.	**10**
b)	Discuss the Liquid phase oxidation with oxygen of acetaldehyde to acetic acid.	**06**

Q.7 Answer the following.

a)	Describe the esterification of carboxylic acid derivative.	**08**
b)	Discuss the properties and application of polyesters.	**08**

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Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
INDUSTRIAL CHEMISTRY
Instrumental Analysis – I (MSC06307)

Day & Date: Tuesday, 09-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct options. **10**

1) ____ are the advantages of TPGC.
   a) RT decreases b) RF increases
   c) Efficiency increases d) all of these

2) _____ is the most important parameter in chromatography.
   a) Resolution b) Mixing
   c) Pretreatment d) none of these

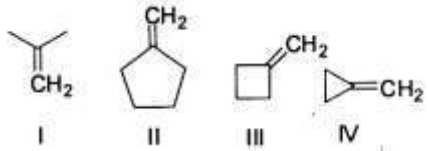
3) At the end of voltammetric analysis, the plot is of potential versus ____.
   a) current b) pressure
   c) temperature d) both a & b

4) The indicator electrode is whose potential is _____with time.
   a) varied b) constant
   c) unaffected d) All of these

5) In linear sweep voltammetry, the current at a working electrode is measured while the potential between the working electrode and a reference electrode is swept _____in time.
   a) diagonally b) radially
   c) linearly d) All of these

6) In D.C. polarography, dropping mercury electrode is used as a _____.
   a) anode b) cathode
   c) counter d) none of these

7) Which out of the following compounds, is expected to show lower C=C stretching frequency?

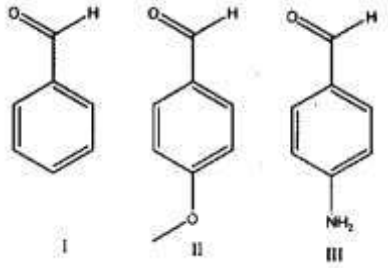


   a) I b) II
   c) III d) IV

8) Nephelometry is concerned with measure of the intensity of ___ light as a function of concentration.
   a) scattered b) transmitted
   c) reflected d) absorbed

9) In nephelometry, the intensity of transmitted light is measured in a line i.e._____° to the incident light.
   a) 360 b) 180
   c) 90 d) 0

10) Arrange the following in the increasing order of C=O stretching frequency.



   a) (I)>(II)>(III) b) (III)>(II)>(I))
   c) (II)>(III)>(I) d) (II)>(I)>(III

B) Write true/false. **06**

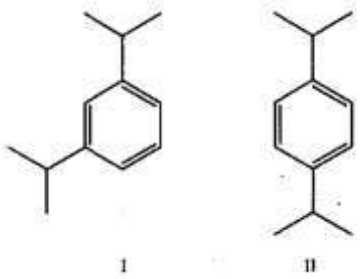
1) Nephelometry and turbidimetry are used to analyze the colloidal system.
2) The output of voltammetry is polarogram.
3) The glass electrode is used to check the current of the solution.
4) The stationary phase in LC-MS is solid.
5) The residual current in D.C. polarography is due to the reduction of analyte.
6) Helium is used as a carrier gas in gas chromatography.

Q.2 Answer the following. **16**

a) Write any four applications of ionic conductors with examples.

b) Discuss Ilkovic equation for polarographic analysis.

c) How many ^{13} C NMR resonances are predicted for the following compound?



d) Define chromatography and discuss its types.

Q.3 Answer the following. **16**

a) An organic compound of molecular formula $C_8H_8C_2$ shows the following features:
IR(KBr) : 1740cm^{-1}; 3200-3300cm^{-1}(broad)
^{1}HNMR : 3.89δ (s, 3H); 6.88δ (dd, 1H, J= 7.2 Hz and J=1.5Hz); 6.90δ (s, 1H, broad);
7.41-7.49δ (m, 2H); 7.88δ (dd, 1H, J= 8.0 Hz and J=2.0Hz);
Predict the structure

b) An organic compound of molecular formula $C_{12}H_{15}O_2N$ shows the following features:
IR(KBr) : 1670cm-1;
^{1}HNMR : 8.0δ (d, 1H, J=12.1 Hz); 7.7δ (d, 2H, J=8.0 Hz); 6.8δ (d, 2H, J=8.0Hz); 5.8δ (d, 1H, J=12.1 Hz); 3.8δ (s, 3H); 3.0δ (s, 6H)
Predict the structure.

Q.4 Answer the following. **16**

a) Explain in detail principle, working and applications of turbidimetry with neat labelled diagram.

b) Discuss pH and bio-sensors with necessary mechanism.

Q.5 Answer the following. **16**

a) Explain in detail D.C. polarography with neat labelled diagram.

b) Discuss cyclic voltammetry in detail and how it is useful for analysis of metal ions.

Q.6 Answer the following. **16**

a) Write the principle, instrumentation, working and applications of gas chromatography.

b) Discuss plate theory of chromatography and write the applications of GC-MS in various industries.

Q.7 Answer the following. **16**

a) Explain with illustration programmed flow chromatography.

b) Discuss gas sensors in detail with diagram.

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Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
INDUSTRIAL CHEMISTRY
Chemical Industries (MSC06401)

Day & Date: Monday, 18-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Multiple Choice Questions. **10**

1) How much carbon is present in cast irons?
   a) Less than 0.05% b) Up to 1.5%
   c) 1.5% to 2% d) More than 2%

2) What is a vehicle in paint used for?
   a) To obscure surface b) To adhere to surface
   c) To provide shine to surface d) To reduce crack on surface

3) Which material is commonly used in electronic devices?
   a) Alumina b) Titania
   c) Silica d) Germanium

4) Emulsion Paints contain:
   a) Nitro cotton b) Zinc white
   c) White lead d) Polyvinyl acetate

5) Driers in varnish are used as:
   a) Reducers b) Retarders
   c) Accelerators d) Oxidisers

6) Which of the following is a direct dye?
   a) Phenolphthalein b) Congo red
   c) Alizarin d) Indigo

7) Which defect occurs if a paint is applied excessively thick?
   a) Grinning b) Running
   c) Wrinkling d) Flaking

8) Which of the following is an example of basic dye_____?
   a) Alizarin b) Malachite green
   c) Indigo d) Orange I

9) For the manufacture of glass at what temperature are raw materials put into the furnace?
   a) 1000°C b) 1500°C
   c) 2000°C d) 3000°C

10) The chemical present in flit (finit) is _____.
   a) Malathion b) DDT
   c) BHC d) Aldicarb

B) Fill in the blanks. **03**

1) The _____ pesticides having very low biodegradation and strong affinity for fatty tissues.
2) The full form of CNG is _____.
3) Porcelain is a type of _____ ceramic.

C) State True or False. **03**

1) The fraction of crude oil that is used in LPG (liquid petroleum gas) is refinery gas.
2) Shellac is not an artificial resin.
3) Cobalt is not an example of a base for paints.

Q.2 Answer the following. (Any Four) **16**

a) Describe any one heterocyclic dyes.
b) Explain manufacturing of fat lime.
c) Give functions of pigments in paints.
d) Give important application of borosilcate glass.

Q.3 Answer the following.

a) Write a note on Catalytic cracking. **08**
b) Write a note on Emulsions paint. **08**

Q.4 Answer the following.

a) What is paint? Give its important functions. **08**
b) Give the synthesis of Dimethoate. **08**

Q.5 Answer the following.

a) Give an account of the following organochlorine pesticides w.r.t synthesis and application of aldrin and Dialdrin. **10**
b) What are petrochemicals? Give an outline of chemicals derived from benzene. **06**

Q.6 Answer the following.

a) Give an outline of chemicals derived from propylene. **08**
b) How are ceramics classified? What are the basic raw materials used in ceramics? **08**

Q.7 Answer the following.

a) Give the synthesis and application of Dimethyl carbamate. **08**
b) Give the properties and application of stainless steel. **08**

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Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
INDUSTRIAL CHEMISTRY
Pollution Monitoring and Control (MSC06402)

Day & Date: Tuesday, 19-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct options. **10**

1) Tiny particles in the air that are two and one half microns or less in width are _____.
   a) $PM_{2.5}$ b) $PM_{12.5}$
   c) PM_{10} d) PM_{25}

2) In Indian Constitution, two articles related to the environmental protection are _____ and _____.
   a) Article 48 (A), Article 51 A (g)
   b) Article 8 (A), Article 21 A (g)
   c) Article 88 (A), Article 51 A (g)
   d) Article 18 (B), Article 21 A (g)

3) Section 16 of Water act 1974 provides _____.
   a) Functions of Central Board b) State Water Laboratory
   c) Cognizance of offences d) None of these

4) _____ method is used for the analysis of phosphorous in the soil.
   a) Polanco b) Lewis
   c) Peter d) Olsen

5) The Water (Prevention and Control of Pollution) Cess (Amendment) was put forth in _____.
   a) 2005 b) 2003
   c) 2004 d) 2022

6) The pollen grains are _____ type of air pollutants.
   a) Small droplets b) Gaseous
   c) Particulate matter d) None of these

7) _____ is essential nutrient for plants present in soil.
   a) Chlorine b) Silver
   c) Iodine d) Nitrogen

8) The _____ in water is essential for both flora and fauna.
   a) dissolved oxygen b) suspended solid
   c) chloride d) fluoride

9) _____ can be removed by denitrification from waste water.
   a) Argon b) Chlorine
   c) Nitrogen d) Magnesium

10) _____ includes activities and actions required to stop water pollution and allows more efficient use of water resources.
a) Air Act b) Water management
c) Forest Act d) None of these

B) Write true or false **06**

1) CPCB is an apex organization in the country in the field of pollution control.
2) Chromium can be removed by reduction.
3) The limit for zinc as per MINAS for synthetic fiber industries is 5 mg/L.
4) Ion exchange process is primary water treatment process.
5) Tiny particles in the air that are two and one half microns or less in width are $PM_{2.5}$.
6) Phenolic compounds can be removed by steam gas stripping.

Q.2 Answer the following. **16**

a) Explain the flocculation process for waste water treatment.
b) Explain the sources of phenolic residues in the environment.
c) Give an account on reduction method of chromium removal.
d) Explain soil pollution and its sources briefly.

Q.3 Answer the following. **16**

a) Explain in detail Water (Prevention and Control of Pollution) Act 1974, its implication and application in industrial pollution control.
b) Describe in detail with necessary diagrams the steam gas stripping and oxidation methods for removal of phenolic residues.

Q.4 Answer the following. **16**

a) Discuss any two secondary treatment methods for waste water treatment with diagrams.
b) Explain how CO, SO_2, NO_X and H_2S are analyzed in the air sample?

Q.5 Answer the following. **16**

a) Discuss in detail removal of chromium by ion exchange and reverse osmosis method.
b) Explain in detail toxic effect of mercury and its removal from gaseous and liquid streams.

Q.6 Answer the following. **16**

a) Describe soil pollution and its sources. Explain analysis of soil for the factors such as pH, moisture content and total nitrogen.
b) Explain analysis of water for the factors of dissolved oxygen, chloride, fluoride and suspended solids.

Q.7 Answer the following **16**

a) Discuss the methods used for the recycling of plastic polymers. What are the important products obtained from recycled plastic polymeric materials?
b) What is water management? Explain briefly IS-2490, IS-3360 and IS-3307.

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Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
Industrial Chemistry
Nanomaterials and its Characterization (MSC06403)

Day & Date: Wednesday, 20-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

Q.1 A) Choose correct options. **10**

1) _____ method is used to prepare ultra-pure elements.
   a) Kassinos b) Suzuki
   c) Czochralski d) Miezo

2) Industrial nano-catalysts have _____ surface area.
   a) low b) high
   c) optimum d) minute

3) Photo-assisted CVD is based on the utilization of _____ light for the synthesis.
   a) infra-red b) cosmic
   c) visible d) ultraviolet

4) _____ are the materials also used as sensors in military operations.
   a) nanosensors b) beam sensors
   c) infra-red sensors d) none of these

5) Typical precursors used in sol-gel method are _____.
   a) metal iodides b) metal alkoxides
   c) metal bromides d) metal xanthates

6) _____ helps us in getting a surface information and topography of the specimen.
   a) SEM b) NMR
   c) UV d) GC-MS

7) For destructive interference to take place, the phase difference between the two waves should be _____.
   a) $(2n+1)\Pi//2$ b) $(2n+1)\,\lambda$
   c) $(2n+1)\,\pi$ d) $(2n-1)\,\pi\,/2$

8) Find the Miller index of a plane making intercept ½ a, ½ b, and ¾ c.
   a) (3 4 6) b) (6 3 4)
   c) (6 6 4) d) (4 6 3)

9) _____ technique is used to measure change in enthalpy with respect to temperature in terms of differential power.
   a) DSC b) DTA
   c) Both a & b d) None of the above

10) DTA curve is plotted in between _____.
   a) Change in heat vs Pressure
   b) Change in heat vs Volume
   c) Change in heat vs Temperature
   d) Change in heat vs Gibbs free energy

B) Write true or false. **06**

1) Nebulizer is used to inject small droplets of precursor in electrodeposition method.
2) Nanoparticles are also used in cosmetic industries.
3) In SEM, the secondary electrons radiated back in scanning microscope is collected by electron gun.
4) In TEM, beam of electrons is transmitted through the specimen to form an image.
5) The relation between lattice constant 'r' and edge length 'a' in Face centered cubic unit cell is $r = a / 2\sqrt{2}$.
6) DSC device is a thermal analysis instrument that determines the temperature and heat flow is associated with material transitions.

Q.2 Answer the following. **16**

a) Discuss general applications of nanomaterials.
b) What are zero-, one-, two-, and three-dimensional nanomaterials?
c) Explain with graph the Moisture content curve obtained in TGA analysis
d) Explain in brief the process of X-ray Production

Q.3 Answer the following. **16**

a) Describe in detail the sol-gel and hydrothermal methods with neat labeled diagram for the synthesis of materials.
b) Explain the chemical bath deposition and magnetron sputtering methods for the synthesis of nanomaterials.

Q.4 Answer the following. **16**

a) Explain in detail the principle, construction, working and applications of scanning electron microscopy (SEM).
b) Explain the principles with labeled diagrams of x-ray photoelectron microscopy (XPS) and transmission electron microscopy (TEM).

Q.5 Answer the following. **16**

a) Describe in detail nanosensors, their types, characteristics and general applications.
b) Explain in brief Czochralski method for the preparation of germanium and indium.

Q.6 Answer the following. **16**

a) Give the principle of DTA & describe the factors affecting on DTA analysis.
b) Describe in details the instrumentation of DSC analysis

Q.7 Answer the following. **16**

a) What is Constructive interference phenomenon? Derive Bragg's equation.
b) X-ray diffraction of copper has a face centered cubic structure, which is done using X- ray with a wavelength of $0.154nm$. One peak is seen in XRD pattern at theta$= 21.6°$. What are the miller indices for this peak

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Seat No.		Set	P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
INDUSTRIAL CHEMISTRY
Industrial Management and Material Balance (MSC06408)

Day & Date: Thursday, 21-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any Three questions from Q.No.3 to Q.No.7.
3) Figures to the right indicate full marks.

Q.1 A) Choose the correct alternatives from the options. **10**

1) Following is not the substrates used for ethanol production
   a) Starch containing substrate
   b) Juices from sugarcane or molasses or sugar beet
   c) Waste product from wood or processed wood
   d) Fats containing substances

2) The renewable source of energy is ____.
   a) Coal b) Solar Energy
   c) Wind energy d) Ocean tides

3) A Solution contains 20 mole % B (Y_B = 0.20) Calculate the molar flow rate of B in 500 moles solution /min stream
   a) 200mols B/min b) 100mols B/min
   c) 250mols B/min d) 300mols B/min

4) Researchers use the _____ method to choose the sample members of a population at regular intervals. It requires the selection of a starting point for the sample and sample size that can be repeated at regular intervals. This type of sampling method has a predefined range, and hence this sampling technique is the least time-consuming.
   a) Simple random sampling
   b) Cluster sampling
   c) Systematic sampling
   d) Stratified random sampling

5) Integral type of balance usually applied to a _____.
   a) Continuous process b) Batch process
   c) Semi batch process d) Both b) and c)

6) Which of the following is not an advantage of Incinerators?
   a) Waste are converted to harmless waste
   b) There is no commitment to long term containment of hazardous waste
   c) Ash from a hazardous waste incinerator must be disposed of in a secure landfill
   d) Incinerators handle most reactive wastes prohibited from landfills

7) Define Incompatible chemicals.
   a) Incompatible chemicals refer to chemicals that can react with each other randomly with evolution of heat or to produce flammable products or toxic products.
   b) Incompatible chemicals refer to reactants that can react with each other violently with evolution of water or to produce flammable products or toxic products.
   c) Incompatible chemicals refer to chemicals that can react with each other violently with evolution of heat or to produce flammable products or toxic products.
   d) Incompatible chemicals refer to chemicals that can react with each other violently with evolution of heat or to produce flammable products or non-toxic product.

8) _____ provide machinery on hire-purchase basis to small scale and ancillary industries, the value of which would not exceed Rs. 60 lakhs and Rs. 75 lakhs respectively.
   a) NSIC
   b) SSIC
   c) IDBI
   d) Both a) and b)

9) Technology transfer activities for the transfer of technologies from industrial nations to less-developed countries, usually for the purpose of accelerating economic and industrial development in the poor nations of the world is _____.
   a) International technology transfer
   b) Private technology transfer
   c) Developed to less developed
   d) Public-private technology transfer

10) Energy balances Equation on closed system is _____.
   a) $\Delta U + \Delta E_k + \Delta E_p = Q + W$
   b) $\Delta H + \Delta E_k + \Delta E_p = Q + W$
   c) $\Delta U + \Delta E_k + Q + W$
   d) $U + \Delta E_p = Q + W$

B) Fill in the blanks/Write true or false. **06**

1) An Ancillary industrial undertaking shall mean an industrial undertaking in which the investment in fixed assets in plant and machinery, whether held on ownership terms or by lease or by hire purchase, does not exceed Rs.01 Crore.
   a) True **b)** False
2) Small Scale Industry provide less scope for increasing employment with more investment.
   a) True **b)** False
3) Organic peroxide are shock sensitive chemicals.
   a) True **b)** False
4) Differential type of balance usually applied to a Batch process.
   a) True **b)** False
5) Work done on the process fluid by a moving part within the system is called as flow work.
   a) True **b)** False
6) Applied research is aimed at a fuller, more complete understanding of the fundamental aspects of a concept or phenomenon.
   a) True **b)** False

Q.2 Answer the following. **16**

a) Explain Biofuel and its economy.
b) Define and explain in brief the necessity of Recycle stream.
c) What is technology transfer? How is it transfer?
d) Write a short note on Role of Small scale Industry.

Q.3 Answer the following.

a) Discuss in details manufacturing process of Bio ethanol. **10**
b) What is Fuel Cell? Explain in Detail working of Hydrogen -Oxygen Fuel Cell. **06**

Q.4 Answer the following.

a) One thousand kilograms per hour of a mixture of benzene (B) & toluene (T) containing 50% benzene by mass is separated by distillation into two fractions. The mass flow rate of benzene in top stream is 450 kg B/h & that of toluene in bottom stream is 475 kg T/h. The operation is at steady state. Write balances on benzene & toluene to calculate unknown component flow rates in output streams. **08**
b) Discuss with example the X and R bar chart with respect to sample size five for quality determination. **08**

Q.5 Answer the following.

a) Define Patent. What is the procedure to obtain Patent? **08**
b) Discuss Indian factory act -1948. **08**

Q.6 Answer the following.

a) Two methanol-water mixtures are contained in separate flasks. The first mixture is 40.0 wt % methanol, and the second is 70.0 wt % methanol. If 200 g of the first mixture is combined with 150 g of the second, what will be the mass and composition of the resulting mixture? **08**
b) What is the procedure to start Small scale Industry? **08**

Q.7 Answer the following.

a) Define quality control. Explain its importance. **08**
b) What is Pilot Plant? What is the purpose of Pilot Plant? **08**

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Seat No.		Set	P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
POLYMER CHEMISTRY
Fundamentals of Feedstocks and Polymers (MSC05301)

Day & Date: Friday, 05-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) When there is chain transfer to polymer what type of polymer will form?
   a) Branched polymer b) Linear polymer
   c) Liquid crystal polymer d) None of these

2) The polymers sets irreversibly when heated and cannot be reshaped by heating are termed as?
   a) Thermocrystals b) Thermoplastic
   c) Thermosetting d) Thermoforming

3) What is the role of centrifugal separator called cyclone in the moving bed catalytic cracking method?
   a) Allows to pass only carbon b) Allows to pass only vapours
   c) Allows to pass only catalyst d) Allows to pass nothing

4) Melt polycondensation reaction is carried out under inert atmosphere to avoid which of the following side reactions?
   a) Oxidation b) Decarboxylation
   c) Degradation d) All of these

5) Knocking characteristics of diesel oil are expressed in terms of what?
   a) Octane number b) Gasoline number
   c) Cetane number d) Cracking number

6) Polymer containing uninterrupted series of rings connected by links around which rotation cannot occur, except bond breaking are known as?
   a) Semiladder polymers b) Ladder polymers
   c) Branched polymers d) Single strand polymers

7) What is the IUPAC name of Poly (methyl acrylate)?
   a) Poly[1 -(methoxycarbonyl) ethylene]
   b) Poly[2-(methoxycarbonyl) ethylene]
   c) Poly[1,1-(methoxy carbonyl, methyl) ethylene]
   d) None of these

8) Select the correct Order of knocking among the following?
   a) Branched chain alkanes > straight chain alkanes > olefins > cyclo alkanes > aromatic hydrocarbons.
   b) Straight chain alkanes < branched chain alkanes < olefins < cyclo alkanes < aromatic hydrocarbons.
   c) Straight chain alkanes > branched chain alkanes > olefins > cyclo alkanes > aromatic hydrocarbons.
   d) Olefins < branched chain alkanes < straight chain alkanes < cyclo alkanes < aromatic hydrocarbons.

9) Which of the following is a drawback of Nylon?
   a) Easily Abrasive b) Moisture absorption
   c) Low Electric strength d) Oil receptive

10) Among the following size of monomer droplet in suspension polymerization is depends upon?
   a) Type and speed of stirring.
   b) Type and concentration of initiator.
   c) Monomer to initiator ratio.
   d) All of these

B) Fill in the blanks and Write True/False. **06**

a) Write true or false

1) In the emulsion polymerization surfactant increasing the surface tension at monomer water interface. (True / False)
2) Condensation polymer synthesized from single type of monomer can be named by the Source based nomenclature method. (True / False)
3) After 8 - 10 hrs catalyst stop its functioning in fixed bed catalytic cracking. (True / False)

b) Fill in the blanks

1) In _____ Copolymer backbone is made from one type of monomer and branch is made from another type of monomer.
2) _____ is the trade name of polymer poly(tetrafluoroethylene).
3) Polymers of _____are commonly termed as Polyacetals.

Q.2 Answer the following **16**

a) Give an account on synthesis of HDPE by Ziegler process.
b) Explain the Solid state polymerisation technique with one example.
c) Explain the use of acetylene as building block towards polymer industry.
d) Describe nomenclature of polymers based on structure by semi-systematic nomenclature system.

Q.3 Answer the following

a) What is cracking? Why cracking is necessary? Explain catalytic cracking process. **10**
b) Compare the chain growth and step growth polymerization with suitable examples. **06**

Q.4 Answer the following.

a) How is vinyl chloride prepared? Describe the manufacturing of PVC by suspension and bulk polymerization. **10**
b) Why it is necessary to improve anti knocking characteristics of fuel? Explain the various methods used for the improvement of anti knocking characteristics of gasoline. **06**

Q.5 Answer the following.

a) Explain the melt polycondensation and compare the advantages of solution polycondensation over melt polycondensation. **08**
b) Discuss the synthesis of commercial polymers by batch, semi batch and continuous processes. What are their limitations and which is best to use? **08**

Q.6 Answer the following **08**

a) Discuss the linear, branched and crosslinked polymers with suitable example and its effect on properties of polymers.

b) What is autoacceleration? Discuss the effect of autoacceleration in bulk polymerization method. **08**

Q.7 Answer the following

a) Discuss the importance of Cashew Nut Shell Liquid as resource for monomer and polymers. **08**

b) Explain the synthesis, properties and application of poly (ethylene terephthalate). **08**

SLR-EF-35

Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
POLYMER CHEMISTRY
Morphology and Physical Chemistry of Polymers (MSC05302)

Day & Date: Sunday, 07-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any Three questions from Q.No.3 to Q.No.7.
3) Figures to the right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) The DSC is used to study thermal transitions of polymers like _____.
   a) the glass transition temperature
   b) the change in volume
   c) the change in pressure
   d) the change in mass

2) TMA analysis of polymer is used to estimate _____.
   a) change in dimensions of material against temperature
   b) change in molecular weight of material against temperature
   c) change in viscosity of material against temperature
   d) change in tensile strength of material against temperature

3) LVDT is a type of electrical transformer used for measuring _____.
   a) mechanical strength b) linear displacement
   c) chemical changes d) None of these

4) _____ is the biodegradable polymer.
   a) Polylactic acid b) Polyethylene
   c) Nylon d) Phenol formaldehyde

5) In PVC degradation _____ acid is generated.
   a) Benzoic acid b) Acetic acid
   c) Hydrochloric acid d) Sulphuric acid

6) The value of Ebullioscopic constant or boiling point elevation constant depends on:
   a) amount of solute b) nature of solute
   c) amount of solvent d) None of these

7) The viscosity of liquid _____.
   a) Increase with increase in temperature
   b) Decrease with increase in temperature
   c) Decrease with decrease in temperature
   d) Remain constant regardless of any change in the temperature

8) The end group analysis is used for calculating the _____.
   a) Weight -average molecular weight
   b) Number -average molecular weight
   c) Viscosity -average molecular weight
   d) None of these

9) LVDT is a type of electrical transformer used for measuring _____.
   a) mechanical strength b) linear displacement
   c) chemical changes d) None of these

10) _____ is the principle of centrifugation.
   a) Sedimentation b) Filtration
   c) Evaporation d) Size reduction

B) Fill in the blanks OR write true/false. **06**

1) X-rays are generated when high velocity of electrons impinge on _____ target.
2) The penetration probe in TMA being used to detect a _____ of the polymer.
3) In _____ analysis technique $\Delta T = 0$ is maintained.
4) The Newton's law of viscosity is not applicable to _____.
5) In polymers _____ stability reduction is not depending on the substituent groups of polymeric system.
6) The average functionality is found out in _____.

Q.2 Answer the following. **16**

a) Write a note on Photo stabilizer.
b) What is polydispersity index (PDI)? How it is calculated? Give its importance in polymers.
c) Write a note on number average molecular weight of polymers.
d) How the DSC thermogram of polymers is interpreted? Describe it with suitable diagram.

Q.3 Answer the following.

a) Describe in brief theory, working principal about the thermomechanical analyzer with diagram. **08**
b) Describe in brief theory, working principal about the X-Ray diffraction instrument with diagram. **08**

Q.4 Answer the following.

a) Describe in brief theory, working principal about the membrane osmometry instrument with diagram. **08**
b) Write a detailed note with suitable example on biodegradation of polymers using microorganisms. **08**

Q.5 Answer the following.

a) Write a detailed note on cryoscopy methods of polymers molecular weight analysis. **08**
b) Write a detailed note on ozone attack and antioxidant effect on polymers. **08**

Q.6 Answer the following.

a) Write a detailed note on various factors affecting the glass transition temperature (Tg) of polymers. **10**
b) Write a brief note on crystalline phase of polymers with suitable diagram. **06**

Q.7 Answer the following.

a)	Describe in brief theory, working principal about the Light scattering of polymer molecular weight analysis instrument with diagram.	**10**
b)	Write a note on photo oxidation of polymers with suitable example.	**06**

SLR-EF-36

Seat No.		Set	P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
POLYMER CHEMISTRY
Basic Concepts of Polymerization (MSC05306)

Day & Date: Tuesday, 09-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternatives. (each will carry 1 mark) **10**

1) _____ is used for initiation of monomer to polymer.
   a) Heat or Light b) Initiator
   c) Electromagnetic radiation d) All of the above

2) _____ are the redox initiators.
   a) $C1O_3$- b) $S_2\ O_5^{2-}$
   c) Fe_2+ d) All of the above

3) _____ are the photochemical initiators.
   a) Thermal / Heat b) Ultra violet and visible light
   c) Redox initiators d) All of the above

4) In block copolymerization _____.
   a) r1 and r2 are greater than unity
   b) r1 and r2 are less than unity
   c) r1 and r2 are equal to the unity
   d) none of the above

5) _____ is the example of copolymerization.
   a) Polystyrene
   b) Polyethylene
   c) Styrene butadiene rubber (SBR)
   d) Polyacrylonitrile

6) _____ are used for the co monomer feed composition analysis.
   a) NMR or IR b) HPLC or GC
   c) XRD or TGA d) All of the above

7) _____ is the natural polymer.
   a) Polyisobutylene b) Polymethyl methacrylate
   c) Polytetrafluoroethylene d) Polyisoprene

8) ROP product of Lactam is used in _____.
   a) PVC pipe b) Automobile tyers
   c) Pharmaceutical applications d) bottles

9) In absence of catalyst the order of poly condensation reaction is _____.
   a) First order b) Second order
   c) Third order d) All of the above

10) _____ is/are the starting monomer in addition polymerization.
   a) Diacid and diol b) Ethylene monomer
   c) Styrene monomer d) Both b and c

B) Fill in the blanks. **06**

1) The Free radical are produced by the _____ decomposition of the initiator.
2) In Group transfer polymerization _____ initiator and a _____ catalyst used.
3) Anionic ring opening polymerization is initiated by _____.
4) Benzoyl peroxide is used in _____ polymerization method.
5) Hyper branched polymer was first time synthesized by _____ in1997-2001.
6) In polymer reaction function of Inhibiter is to _____.

Q.2 Answer the following. **16**

a) Write short note on the H-T and H-H polymerization.
b) Write a brief note on Q-e scheme.
c) Write the reaction of Group transfer polymerization.
d) Discuss the Heck reaction with suitable examples.

Q.3 Answer the following.

a) Discuss Suzuki reaction with suitable examples. **08**
b) Derive rate constant for the kinetics of anionic polymerization. **08**

Q.4 Answer the following.

a) Distinguish between radical and ionic polymerization. **08**
b) Derive rate constant for Kinetics of condensation polymerization in presence of catalyst. **08**

Q.5 Answer the following

a) Discuss the various types of redox initiators used in polymerization. **08**
b) Give the examples and applications of commercially available copolymers. **08**

Q.6 Answer the following

a) Describe in detail the role of retardation in polymerization. **08**
b) Explain the Ring opening polymerization mechanism of cyclic ethers. **08**

Q.7 Answer the following

a) Explain the Ring opening metathesis polymerization. **08**
b) Write in detail the ADMET reaction with suitable examples. **08**

SLR-EF-38

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
POLYMER CHEMISTRY
Step-growth Polymers (MSC05401)

Day & Date: Monday, 18-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to the right indicate full marks.

Q.1 A) Choose the correct alternative. (Each Question carry one mark) **10**

1) Terylene belongs to which of the following class of polymers _____.
   a) polyamide b) polyazomethines
   c) polyimides d) polyester

2) _____ provide elasticity to the paint film.
   a) Varnishes b) Plasticizers
   c) Enamels d) Lacquers

3) _____ resin is also called as the phenoplast.
   a) Melamine formaldehyde b) Urea formaldehyde
   c) Phenol formaldehyde d) Both a) & b)

4) The Polyimide film formed by reaction between PMDA & ODA is called as _____.
   a) Lexan b) Sarona
   c) Dacron d) Kapton

5) The reaction between HMDA & Phthalic acid gives the semi aromatic nylon named as _____.
   a) Nylon 6T b) Nylon 7T
   c) Nylon 6A d) Nylon 7A

6) _____ are used as a filler in paint.
   a) Talc b) ground Silicon
   c) Turpentine d) Both a) & b)

7) The PPO is prepared by _____ of 2, 6 disubstituted phenol in the presence of $CuCl_2$ catalyst & amine solvent.
   a) Reductive Coupling b) Redox Coupling
   c) Oxidative Coupling d) None of these

8) The synthesis of polyimide is done by using _____ and _____ in presence of polar aprotic solvent.
   a) PMDA and PPD b) PMDA and OPD
   c) OMDA and PPD d) None of these

9) The phenol is produced by which of the following method.
   a) Hocks process b) Rasching process
   c) Cumene process d) All of these

10) _____ polymer is prepared by reacting of difluoro biphenyl ketone and bisphenol-A in the presence of polar aprotic solvent.
   a) PEN b) PET
   c) PEEK d) PTT

B) Fill in the blanks. (Each Question carry one mark) **06**

1) _____ is a mechanical dispersion mixture of one or more pigments in a vehicle.
2) _____ is the crosslinking agent used for Novolac.
3) The peeling off of paintfrom the painted surface is called as _____.
4) In the first step of preparation of polyparaphenylene (PPP) polymer _____ catalyst is used.
5) Chromium oxide is an example of _____ pigment.
6) ω- amino undecanoic acid gives _____ polymer.

Q.2 Answer the Following. **16**

a) Define Pigment and describe the different properties for selection of Pigments.
b) Give an example of unsaturated Polyester and discuss about unsaturated network polyester.
c) Give details about Nomex.
d) Write a note on Bismaleimide.

Q.3 Answer the following. **16**

a) Discuss the Non-phosgenation reaction of polycarbonate as well as give the properties and applications of polycarbonates.
b) Describe the synthesis of formaldehyde and Hexa. Give the synthesis of Backelite.

Q.4 Answer the following. **16**

a) Give the synthesis of different types of monomers required for synthesis of PEN and give properties of PEN.
b) Write a detailed note on PBI.

Q.5 Answer the following. **16**

a) Describe the methods of application of paint and explain the failure of paint.
b) Explain in details the liquid as well as solid epoxy resin.

Q.6 Answer the following. **16**

a) Give the synthesis of PEEK and its applications.
b) Write down the acidic as well as basic mechanism of synthesis of Phenol Formaldehyde resin.

Q.7 Answer the following. **16**

a) Explain in brief the Ball Mill method and give its applications.
b) Describe Synthesis, Properties and Applications of Polysulfone.

SLR-EF-39

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
POLYMER CHEMISTRY
Stereoregular Polymers and Modern Polymerization Methods (MSC05402)

Day & Date: Tuesday, 19-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question number 1 and 2 are compulsory.
2) Attempt any three questions from question number 3 to question No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. (MCQ) **10**

1) Weight average molecular weight of S-B block copolymers can be determine by which of the following method?
   a) Membrane Osmometry b) Light Scattering
   c) Ultracentrifugation d) Viscometry

2) Which letters are used in denoting Relative Configuration?
   a) D and L b) E and Z
   c) R and S d) P and Q

3) In terms of the nomenclature used for stereoregular polymers, amylose has which structure?
   a) Erythrodiisotactic b) Threodiisotactic
   c) Threodisyndiotactic d) Erythrodisyndiotactic

4) SBR is what type of copolymer?
   a) Monoblock copolymer b) Diblock copolymer
   c) Triblock copolymer d) Terpolymer

5) In Ziegler-Natta polymerizations which is the most widely studied systems?
   a) Vanadium - Beryllium. b) Titanium - Gallium.
   c) Titanium-Aluminum. d) Vanadium - Zinc.

6) Which is the most powerful spectroscopic technique for analysis of stereoregularity in polymers?
   a) FT-IR b) UV
   c) Mass d) NMR

7) Among the following which polymer is referred to as thermoplastic elastomers (TPEs)?
   a) Polyurethanes b) Polyethylene
   c) Polysyrene d) All of above

8) Why the cationic polymerization of 1,3-dienes is not of practical interest?
   a) The products are usually high molecular weight.
   b) The products are usually high molecular weight with cyclized structures.
   c) The products are usually low molecular weight with cyclized structures.
   d) None of above

9) In which the model last monomer unit is important in determining polymer stereochemistry?
   a) Bernoullian Model
   b) First-Order Markov Model
   c) Ostwald Model
   d) Ziegler Model

10) Among the following which approaches will yield well defined styrene-diene ABA structure?
   a) Difunctional initiator process
   b) Coupling process
   c) Tapered block process
   d) All of these

B) Fill in the blanks and write true / false **06**

a) Write true / false

1) Monometallic mechanism is proposed by Scientist Natta has gain more importance.
2) The R and S Configurations's priority rules cannot be applied strictly to polymers.
3) In Cationic coordination polymerization mechanism the polymer chain end having a partial negative charge.

b) Fill in the blanks.

1) Due to _____ Beryllium compounds have received little attention in the synthesis of Z-N Initiators?
2) When vacant d orbital will regenerate at alternate position in monometallic mechanism, _____ polymer will be formed?
3) In stereochemistry Carbon attached to four different substituents are called as _____.

Q.2 Answer the following. **16**

a) State the primary and secondary insertion process with chemical reaction in Z-N polymerization.
b) Describe the absolute configuration.
c) Explain the First Order Markov Model.
d) Describe the stereoisomerism in polyactaldehyde.

Q.3 Answer the following.

a) Describe the stereospecific polymerisation of 1,3- dienes by using various Catalysts via radical and anionic polymerization. **10**
b) Discuss the observed rate behavior of heterogeneous systems in kinetic of Z-N Polymerization. **06**

Q.4 Answer the following.

a) Discuss the stereoisomerism of poly (2 - pentene). **10**
b) Discuss the synthesis, properties and applications of styrene-butadiene diblock co-polymer. **06**

Q.5 Answer the following.

a) Discuss the stereoisomerism in the polymerization of 1,1- disubstituted ethylene monomer with suitable example. **08**
b) Explain the synthesis, properties and uses of (A-B)n multiblock copolymer. **08**

Q.6 Answer the following.

a) Discuss the monometallic mechanism of $AlEt_3$ – $TiCl_3$ system in polymerization of Propylene monomer. **08**

b) Give an account on the mechanism of ionic and co-ordination polymerization. **08**

Q.7 Answer the following.

a) Discuss the Atom Transfer Radical Polymerization. (ATRP). **08**

b) Describe the various stereoregular polymer structures of polycyclopentene. **08**

SLR-EF-40

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
POLYMER CHEMISTRY
Selected Topics in Polymers (MSC05403)

Day & Date: Wednesday,20-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. (Each question carry 1 mark) **10**

1) _____ compound is used in plastic surgery & pipes used for medical purposes.
   a) Silicone fiber b) Silicone fluid
   c) Silicone rubber d) Silicone resin

2) The process of combination of one conducting and other non-conducting polymers & forms a conducting polymer is known as _____.
   a) Blending b) Alloying
   c) Mixing d) Blocking

3) The art and science of producing pattern on the substrate is called as _____.
   a) Photography b) Geography
   c) Lithography d) None of these

4) In arthroplasty _____ material is used.
   a) UHMWPE b) UHMWPS
   c) UHMWPVC d) UHMWPE

5) The Cellulose contains _____ unit in it.
   a) Glucose b) Propene
   c) Lactose d) Ethene

6) The Cellulose cannot be used directly for processing due to _____.
   a) Low crystallinity b) Aliphatic structure
   c) Aromatic structure d) High crystallinity

7) Cellulose acetate is _____ derivative of Cellulose.
   a) Ether b) amide
   c) Ester d) alcohol

8) Polychloroprene is prepared by _____ polymerization technique.
   a) Solution b) emulsion
   c) Suspension d) all of these

9) _____ polymer blend has two glass transition temperatures.
   a) Miscible b) Soluble
   c) Immiscible d) Insoluble

10) Butyl rubber is prepared by _____ polymerization technique.
a) Solution b) emulsion
c) Suspension d) all of these

B) Fill in the blanks. (each question carry 1 mark) **06**

1) The delocalization of _____ electrons create the conductivity.
2) In P-type doping _____ substances are added.
3) SBR is also known as _____.
4) _____ is the most commonly used material in the production of blood containing devices such as heart valves.
5) _____speed up the reactions in vulcanization process.
6) _____ is used as a soluble polymer support.

Q.2 Answer the following **16**

a) Explain in details polymer Nano-composites.
b) Define conducting polymer and explain intrinsic as well as doped conducting polymers.
c) Write a note on waste management of polymers.
d) Give various plastic recycling codes and names of corresponding polymers.

Q.3 Answer the following

a) Enlist various cellulose derivatives. Give the details of synthesis of any one derivative. **08**
b) Explain in details polymer composites and give its applications. **08**

Q.4 Answer the following

a) What is click polymerization? Explain with an example. **08**
b) Compare the characteristic features of SBR, nitrile, butyl and EPDM rubber. **08**

Q.5 Answer the following

a) Why polymer supported catalysts are preferred? Explain with a suitable example. **08**
b) Explain various reactions involved in the modification of Polystyrene. **08**

Q.6 Answer the following

a) Explain in details polymer composites and give its applications. **08**
b) Define Liquid crystal polymers, explain its types and give its applications. **08**

Q.7 Answer the following

a) Write a note on various types of additives used in rubber and explain their role. **08**
b) Write a note on polymers in pharmaceutical applications. Explain with an example on use of polymer in controlled drug release application. **08**

SLR-EF-41

Seat No.	

Set P

M.Sc. (Semester-IV) (New) (CBCS) Examination: Oct/Nov-2023
POLYMER CHEMISTRY
Processing Technology and Polymer Properties (MSC05408)

Day & Date: Thursday, 21-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question 1and 2 are compulsory.
2) Attempt any Three from Q.3 to Q.7.
3) Figure to right indicate full marks.

Q.1 A) Choose the correct alternatives. **10**

1) Dielectric loss factor of the polymer depends on _____.
   a) Polarization in space charge region
   b) Porosity
   c) Dielectric constant
   d) All of the above

2) Bulk density is _____.
   a) The weight per unit mass
   b) The weight per unit volume of material
   c) The weight per unit Kilogram
   d) All of the above

3) Smoke free, candle like flame occurs during burning test for _____.
   a) Styrene - butadiene b) Polychloroprene
   c) Poly butylene d) Butile rubber

4) The monomers are _____.
   a) Bifunctional b) Polyfunctional
   c) Trifunctional d) All of the above

5) Tensile and tear properties occur in _____.
   a) Pipes b) Elastomers
   c) Container d) Both, b and c

6) _____ is not a characteristic of rubber.
   a) Non-crystalline b) Chemical resistance
   c) Electrical conductivity d) Low softening temperature

7) The _____ process involves cycles clamping, heating, forming, cooling and removal of the sheet.
   a) Injection molding b) Thermoforming molding
   c) Compression molding d) Transfer molding

8) _____ is an extremely popular and well used process for producing hollow products.
   a) Compression molding b) Rotational molding
   c) Extrusion molding d) Thermoforming molding

9) The storage of modulus and loss of modulus gives idea about ____.
   a) Dilatants b) Dynamic Mechanical behavior
   c) Pseudoplastic d) Viscous flow

10) _____ plastic material follows finite strain rate.
   a) Pseduoplastic b) Bingham body
   c) Dilatant d) St. Venal body

B) Fill in the blanks. **06**

1) In Non-Newtonian fluid stress strain curve is _____.
2) _____ is the properly of recovering original shape after the removal of deforming strain.
3) The feed zone, compression zone, metering zone are used in _____ molding.
4) The majority of the thermoset resins are used for _____ molding and _____ molding.
5) The burst threshold test is used for _____.
6) Flexural strength is also known as _____ strength.

Q.2 Answer the following. **16**

a) Describe the structural relationship of elastomers, fiber and plastics.
b) Explain the refractive index and gloss haze.
c) Describe transfer molding process with neat labeled diagram.
d) Write a short note on the viscoelastic behavior.

Q.3 Answer the following.

a) Describe in detail the water absorption and moisture content in polymers. **08**
b) Draw neat labeled diagram and explain in detail single screw extrusion molding. **08**

Q.4 Answer the following.

a) Describe in detail the % elongation at brake and stress-strain curves of polymers. **08**
b) Explain the factors affecting on mechanical spectra of polymeric materials. **08**

Q.5 Answer the following.

a) Discuss the difference between ideal/Newtonian and Non-Newtonian fluid. **08**
b) Explain in detail with neat labeled diagram the injection molding process. **08**

Q.6 Answer the following.

a) Discuss the flexural strength test for polymer testing. **06**
b) Give the various types of fibers and explain post-spinning process in detail. **10**

Q.7 Answer the following.

a) Discuss the difference between compression molding and thermoforming process. **08**
b) Describe the general behaviors of the polymer melts. **08**

SLR-EF-43

Seat No.	

P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICAL CHEMISTRY
Quantum Chemistry (MSC11301)

Day & Date: Friday, 05-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) Which of these physicists assigned a wave function to all quantum objects?
   a) Planck b) de Broglie
   c) Einstein d) Schrodinger

2) The uncertainty principle applies to _____.
   a) energy and momentum b) velocity and position
   c) momentum and position d) energy and position

3) The zero point energy of simple harmonic oscillator is _____.
   a) $0\ h\nu$ b) $\infty\ h\nu$
   c) $\frac{1}{2}\ h\nu$ d) $h\nu$

4) Quantum mechanics describes the motion of objects _____.
   a) moving at high speed
   b) everyday objects
   c) of macroscopic sizes
   d) in strong gravitational fields

5) When two waves strengthen each other, we are talking about _____.
   a) destructive interference
   b) destructive diffraction
   c) constructive interference
   d) constructive diffraction

6) _____ is the eigen function of d^2/dx^2 operator.
   a) $\sin x$ b) $\cos x$
   c) e^x d) all of these

7) The atomic orbital not allowed in quantum theory is _____.
   a) 4p b) 5g
   c) 3f d) 4d

8) Which of the following wave function is an eigen function of an operator d/dx?
   a) $\Psi = x$ b) $\Psi = e^{-x}$
   c) $\Psi = \sin x$ d) all of these

9) The limits for Cartesian coordinates are _____.
   a) $-\infty$ to $+\infty$ b) 0 to ∞
   c) 0 to r d) $-r$ to r

10) $\hat{A}\Psi = \lambda\Psi$, In this expression λ represents,
   a) eigen function b) eigen value
   c) arbitarary constant d) all of the above

B) Fill in the blanks OR Write true/false **06**

1) One can use Newtons laws of motion to the subatomic particles. (True / False)
2) The wavelength of an electromagnetic radiation is related with its frequency by the relation _____.
3) The del (∇) operator is expressed as _____.
4) Wein's displacement law is mathematically expressed as _____.
5) The overlap integrals in Huckel molecular orbital theory is always taken as zero. (True / False)
6) The Bohr atomic model can explain Zeeman and Stark effect. (True / False)

Q.2 Answer the following. **16**

a) Write down the expression for $[x.d/dx]^2$ and $[d/dx.x]^2$

b) Give the physical interpretation of Ψ and Ψ^2 for quantum mechanical harmonic oscillator.

c) For a particle in a three dimensional rectangular box of dimenstions $a_x = 3 \times 10^{-15}m, a_y = 4 \times 10^{-15}\ m$ and $a_2 = 5 \times 10^{-15}m$, calculate the ground state energy.

d) X-ray having wavelength 0.85 nm are scattered by block of carbon. The wavelength of scattered radiation is 0.9 nm. Estimate the angle of scattering.

Q.3 Answer the following.

a) Using Hukel Molecular Orbital Theory, evaluate the MO coefficients for wave functions of allyl molecule. **08**

b) Give an account of variation method utilized for evaluation of energy. **08**

Q.4 Answer the following

a) Describe the variation method for the calculation average energy of molecules. **08**

b) Discuss restricted and unrestricted HF methods. **08**

Q.5 Answer the following

a) Derive the expression for Schrodinger equation for particle in three dimensional cubical box. **08**

b) Describe quantum mechanical approach of photoelectric effect. **08**

Q.6 Answer the following

a) Discuss Slater and Guassian type of orbitals. **08**

b) Discuss in detail the radial plots for hydrogen atom. **08**

Q.7 Answer the following

a) Using method of separation of variables break up the Schrodinger wave equation for rigid rotator into ordinary angular equations. **08**

b) Discuss Planck's quantum mechanical treatment for black body radiation distribution. **08**

SLR-EF-44

Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICAL CHEMISTRY
Electrochemistry (MSC11302)

Day & Date: Sunday, 07-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any Three questions from Q.No.3 to Q.No.7.
3) Figures to the right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) In electrolysis _____ energy is used to bring about the chemical change.
   a) light b) mechanical
   c) electrical d) kinetic

2) At high voltage the conductance of an electrolyte solution increases due to ____effect.
   a) Debye b) Falkenhagen
   c) Wien d) Debye-Falkenhagen

3) In Debye-Huckel Onsager equation the value of constant B = _____
   a) $8.2.0 \times 10^5 / (DT)^{2/3}$ b) $82.4 / (DT)\eta$
   c) $8.2.0 \times 10^5 / (DT)^{3/2}$ d) $8.24 / (DT)^{2/3}$

4) The time for which the decay of old ionic atmosphere lags behind the formation of new one is called _____time.
   a) relaxation b) half life
   c) full life d) all of these

5) The ideal efficiency of fuel cell is given by ____.
   a) $\Delta G / \Delta H$ b) $\Delta H / \Delta G$
   c) $\Delta S / \Delta H$ d) $\Delta G / \Delta S$

6) The thickness of ionic atmosphere _____ with increase of concentration and valancy of ion.
   a) Decreases b) increases
   c) remains constant d) both (b) and (c)

7) What is the main principle of electroplating?
   a) Hydrolysis b) neutralization
   c) Esterification d) saturation

8) Which of the following solutions cannot conduct electricity?
   a) sugar in water b) NaCl in water
   c) KCl in water d) MgCl2 in water

9) The current density in electroplating is usually expressed in ____unit.
   a) A-cm^2 b) A ft^{-2}
   c) A-m d) A ft^3

10) The activity for pure metals is considered to be _____.
   a) Unity b) zero
   c) Infinity d) none of these

B) Fill in the blanks OR write true/false. **06**

1) The basis of electroplating process is electrolysis. [True/False]
2) The concept of association of ions to form ion pairs was introduced by the scientist _____.
3) The Nernst equation is represented as _____.
4) The activity of a pure gas is always taken as infinity. [Ture/False]
5) The movement of liquid through the pores of a diaphragm under the influence of an applied E.M.F. The phenomenon is known as _____.
6) The equivalent conductance increases with increase in concentration. [True/False]

Q.2 Answer the following. **16**

a) Explain the construction and working of Lippmann capillary electrometer.
b) Calculate the thickness of ionic atmosphere for 1:1 electrolyte in water (D = 78.6) at 0.01 moles at 25°C and comment on the result.
c) Discuss the Bernal and Fowler method of determining heats of hydration.
d) In a fuel cell carbon is used as a fuel. The thermodynamic parameters for the cell reaction are $\Delta H° = -67.63$ k cal/ mol and $\Delta G° = -61.45$ k cal/ mol with an equilibrium potential of 1.333 V. If oxygen is used as the oxidant, write the cell reaction and calculate the efficiency of the fuel cell.

Q.3 Answer the following.

a) Derive Debye- Huckel - Onsager equation. **08**
b) What are the experimental proofs for Debye- Huckel theory. Explain how they support the ionic atmosphere formation. **08**

Q.4 Answer the following.

a) Derive Debye-Huckel limiting law. **08**
b) Explain the mechanism of abnormal ionic conductance's of hydrogen and hydroxyl ions. **08**

Q.5 Answer the following.

a) Derive Butler-Volmer equation for an electrode reaction. **08**

b) Explain the experimental determination of overvoltage. **08**

Q.6 Answer the following.

a) For an electrode reaction show that $i = i0\{F\ n/RT\}$ **08**

b) Discuss the importance's of diffusion overpotential. **08**

Q.7 Answer the following.

a) What is zeta potential? Estimate zeta potential of a particle moving with velocity $1x10^{-4}$ cm/s in water under potential gradient of 15V. Given η= 0.01 poise and D= 78.6 at 298 K. **08**

b) What are the different forms of activity coefficients? Establish the inter relationships between them. **08**

SLR-EF-45

Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICAL CHEMISTRY
Molecular Structure-I (MSC11306)

Day & Date: Tuesday, 09-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) A cyclic group can be generated by a/an _____ element.
   a) singular b) non-singular
   c) inverse d) multiplicative

2) Which of the following molecules is an example of C_s point group?
   a) HCl b) CO_2
   c) CH_2BrCl d) $CHCl_3$

3) Which of the following transitions mainly occur in IR?
   a) Electronic transitions only
   b) Rotational and vibrational transitions
   c) Rotational transitions only
   d) All the electronic, rotational, vibrational transitions

4) Force constant is expressed in _____.
   a) Dynes cm^{-2} b) Nm^{-2}
   c) Nm^{-1} d) All

5) Distortion factor is present in _____ diatomic molecule.
   a) non-rigid b) rigid
   c) linear d) non-polar

6) Raman frequencies are generally identical with ___ vibrational frequencies.
   a) Ultra violet b) Infrared
   c) Visible d) Microwave

7) Beer's law states that the intensity of light decreases with respect to ____.
   a) Concentration b) composition
   c) distance d) volume

8) Which of the following is an application of electronic spectroscopy?
   a) Detection of impurities
   b) Control of purification
   c) Study of kinetics of the chemical reaction
   d) All of the above

9) For spherical top molecule _____.
   a) $I_b = I_c \neq I_a$ b) $I_b = I_c \geq I_a$
   c) $I_b = I_c = I_a$ d) $I_b \neq I_c \neq I_a$

10) Raman effect supports _____ theory.
   a) Wave theory b) Corpuscular theory
   c) EM theory d) Quantum theory

B) Fill in the blanks: **06**

1) H_2O molecule belongs to the _____ point group.
2) NH_3 can be considered as _____ Rotor.
3) The energy of the lowest vibrational level of oscillator is called as ____ Energy
4) In Fortrat diagram, the band head is at the _____ of parabola.
5) Birge-Sponer extrapolation is used to determine _____ energy of molecule.
6) The number of possible modes of vibrations in HCl molecule is/are ____.

Q.2 Answer the following. **16**

a) What is point groups? Illustrate with examples.
b) Write note on Morse potential energy.
c) Define frequency, wavelength and amplitude of electromagnetic radiation. Calculate the frequency of radiation whose wavelength is 400 nm. Express this wavelength in wave number.
d) Write note on: Birje-Sponer extrapolation.

Q.3 Answer the following.

a) Describe the important properties of irreducible representations. **06**
b) Define electromagnetic spectrum? Explain the characteristics of electromagnetic radiations. **10**

Q.4 Answer the following.

a) Describe rotational fine structure of Raman spectra in general. **06**
b) State Lambet-Beer's law? Derive expression for integrated absorption coefficients. **10**

Q.5 Answer the following.

a) Describe diagrammatically various components of microwave spectrometer. **06**
b) State Frank-Condon Principle. Describe intensities of vibrational-electronic spectra perating it for various states **10**

Q.6 Answer the following.

a) Describe classical theory of Raman Effect **06**
b) Define symmetry element and describe different types of operations with suitable examples. **10**

Q.7 Answer the following.

a) The B value estimated for H^1Cl^{35} is 10.59342 cm^{-1}. The masses of H^1 and Cl^{35} are 1.0078250 and 34.9688527 amu. What is the bond length of the molecule? **06**
b) What is the significance of zero point energy? Obtain an expression for zero point energy of an anharmonic oscillator. **10**

SLR-EF-47

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICAL CHEMISTRY
Statistical Mechanics and Irreversible Thermodynamics (MSC11401)

Day & Date: Monday, 18-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. (MCQ) **10**

1) For an atom, the term is $^3P_0$, the electronic partition function will be _____.
   a) 1 b) 2
   c) 5 d) 0

2) According to Dulong-Petit's law, the heat capacity of an atomic solid at room temperature is ~ _____ cal/K/mol.
   a) 1 R b) 2 R
   c) 3 R d) 6R

3) The symmetry number for benzene molecule is _____.
   a) 2 b) 4
   c) 8 d) 12

4) For every rotational level 'J', corresponding degeneracy is _____.
   a) $J + 1$ b) $2J + 1$
   c) $J - 1$ d) $2J - 1$

5) The entropy generation _____.
   a) does not depend upon path followed by a system
   b) depends upon path followed by a system
   c) takes place in reversible process
   d) All of the above

6) According to Debye's theory of specific heat at low temperatures specific heat is proportional to _____.
   a) T b) T^2
   c) T^3 d) independent of T

7) How many particles can occupy the single energy state if these particles obey Fermi-Dirac statistics?
   a) 1 b) 2
   c) 3 d) 4

8) The unit of partition function is _____.
   a) cm b) cm^2
   c) cm^{-1} d) dimensionless

9) All phase transformation processes are the constant _____ processes.
   a) pressure b) volume
   c) mass d) energy

10) The difference between fermions and bosons is that bosons do not obey _____.
   a) Aufbau principle
   b) Pauli's Exclusion Principle
   c) Hund's Rule of Maximum Multiplicity
   d) Heisenberg's Uncertainty Principle

B) Fill in the blanks OR Write True/False. **06**

1) Symmetry number for CH_4 molecules is _____.
2) As $T \rightarrow 0, Cv \rightarrow$ _____.
3) The unit of molecular partition function is _____.
4) As temperature decreases ortho to para hydrogen ratio _____.
5) Light photons follow _____ statistics.
6) Streaming potential is reverse to _____.

Q.2 Answer the following. **16**

a) Derive Saxen's relations.
b) Write on exact and inexact differentials.
c) Explain the concept of electron gas in metals.
d) Write a note on electrokinetic effects.

Q.3 Answer the following.

a) Show that $Q_{trans} = (2\,\pi\,m\,k\,T)^{3/2}/h^3$.V. Write down the equation for S_{trans}. **08**

b) Discuss in brief Einstein's theory for heat capacity of solid. **08**

Q.4 Answer the following.

a) Derive the expression for Fermi-Dirac statistics. **08**
b) Derive the expression for Bose-Einstein statistics. **08**

Q.5 Answer the following.

a) Derive vibrational partition function. **08**
Evaluate vibrational partition function for O_2 molecule at 2727 °C.
(Given- fundamental vibrational frequency $= 1.3216 \times 10^{14}\ Hz$)

b) Derive an expression for Sackur-Tetrode equation for translational entropy. **08**

Q.6 Answer the following.

a) Define ensemble. Discuss in detail canonical and microcanonical ensembles. **08**
b) Estimate the rotational partition function, Q_{rot}, for O-H radical at 298 K. **08**
(Given $r_{O-H} = 0 - 97$ Å)

Q.7 Answer the following.

a) Discuss entropy production due to heat flow. **08**
b) Illustrate Onsager's theory of microscopic reversibility **08**

SLR-EF-48

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICAL CHEMISTRY
Chemical Kinetics (MSC11402)

Day & Date: Tuesday, 19-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternatives. (MCQ) **10**

1) According to transition state theory one of the vibrations in the activated complex is a loose vibration. The partition function for this loose vibration is equal to (k_B Boltzmann's constant & h plank's constant) _____.
   a) $k_B\,T/h$ b) $hv\,/\,k_BT$
   c) k_BT d) $k_BT/\,hv$

2) For first order reaction $A \rightarrow$ Products $t_{1/2}$ is 200 s the rate constant of the reaction is _____.
   a) $6.9 \times 10^{-2}\,s^{-1}$ b) $3.45 \times 10^{-4}\,s$
   c) $3.45 \times 10^{-3}\,s^{-1}$ d) $34.0 \times 10^{-2}\,s^{1}$

3) Potential energy of the reactant is less than the potential energy of the product, then the reaction is _____.
   a) exothermic b) endothermic
   c) Spontaneous d) chain

4) For a reaction, the rate constant k at 27^0C was found to be $k = 5.4 \times 10^{11}\,e^{-50}$, The activation energy of the reaction is _____.
   a) $50\ \mathrm{Jmol^{-1}}$ b) $415\ \mathrm{Jmol^{-1}}$
   c) $15000\ \mathrm{Jmol^{-1}}$ d) $125{,}000\ \mathrm{Jmol^{-1}}$

5) The activation energy for the bimolecular reaction $A + B\ C \rightarrow AB + C$ is E_0 in the gas phase. If the reaction is carried out in a confined volume of λ^3, the activation energy is expected to _____.
   a) remain unchanged b) increase with decreasing λ
   c) decrease with decreasing λ d) oscillate with decreasing λ

6) In the Lindeman mechanism of unimolecular reaction, the observed order at low concentration is _____.
   a) 0.5 b) 1
   c) 1.5 d) 2

7) If E_a of a reaction is zero, k is equal to _____ (where A is frequency factor.)
   a) infinity b) 0
   c) A d) A^{-1}

8) The most used acid catalyst in oil industry and the _____ relevant process are respectively _____.
   a) aluminophosphate and reforming
   b) aluminosilicate and cracking
   c) aluminosilicate and reforming
   d) aluminophosphate and cracking

9) Which of the following observations is incorrect about the order of a reaction?
   a) Order of a reaction is always a whole numb
   b) The stoichiometric coefficient of the reactants doesn't affect the order
   c) Order of reaction is the sum of power to express the rate of reaction to the concentration terms of the reactant
   d) Order can only be assessed experimentally

10) In the presence of a catalyst, the heat evolved or absorbed during the reaction _____.
   a) increases. b) decreases.
   c) remains unchanged. d) may increase or decrease.

B) Write true/false **06**

1) The order of a reaction is always equal to the sum of the stoichiometric coefficients of reactants in the balanced chemical equation for a reaction
2) A spontaneous reaction doesn't have an activation energy.
3) Enzyme-catalysed reactions do not involve a transition state.
4) Reaction between hydrogen and chlorine gas is an example of chain reaction.
5) The rate of a chemical reaction tells us about how slow or fast the reaction is taking place.
6) E_a is affected by catalyst.

Q.2 Answer the following **16**

a) Define branched and non-branched chain reactions.
b) Define the terms and mention one example:
   a) reversible reactions b) chain reactions
c) Define elastic collision and inelastic collision.
d) What is Arrhenius equation? How it is used in the determination of energy of activation?

Q.3 Answer the following

a) Write a note on comparative study of Hydrogen-Halogen reaction. **08**
b) Discuss the kinetics of thermal decomposition of acetaldehyde. **08**

Q.4 Answer the following

a) Construct multidimensional potential energy surfaces. Explain saddle point and reaction coordinate **08**
b) Using Lindemann's unimolecular reaction mechanism derive a rate equation and explain its limiting cases. **08**

Q.5 Answer the following

a) Write a note on Lineweaver-Burk plot. **08**

b) Solve the following problems: **08**

1) The energy of activation of a certain reaction is 183.761 kJ and the rate constant at $458\ K$ is 2.21×10^{-5} min^{-1}. Calculate the rate constant at $510\ K$ ($R = 8.368$ J/K/mol)
2) Calculate ΔG^* for dimerisation reaction at $326K$ having velocity constant $k = 1.42 \times 10^{-2}$ dm^3/mole/sec. ($h = 6.626 \times 10^{-34}\ Js$, Boltzmann constant $k = 1\ .38 \times 10^{-23}$J/K, $R = 8.314$ J/K/mole)

Q.6 Answer the following

a) Derive the rate expression for the reaction between H_2 and I_2. **08**

b) Illustrate the kinetics of the reaction between H and H_2. **08**

Q.7 Answer the following

a) What are the characteristics of enzyme catalysis? **08**

b) Illustrate kinetics of consecutive reactions with suitable example. **08**

SLR-EF-49

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICAL CHEMISTRY
Molecular Structure-II (MSC11403)

Day & Date: Wednesday, 20-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose the most correct alternative of the following and rewrite the sentences. **10**

1) The product $q \times d$ is called as _____.
   a) Dipole moment b) Group moment
   c) Bond moment d) None of these

2) Magnetic lines of force are attracted towards _____ substance.
   a) Diamagnetic b) Paramagnetic
   c) Gaseous d) Pure

3) The splitting for -CH_2 group in proton NMR of CH_3-CH_2-OH will be observed as: _____.
   a) Doublet b) Singlet
   c) Quartet d) Triplet

4) ESR spectroscopy is the study of interaction between _____.
   a) An external magnetic field and the unpaired electrons
   b) An external magnetic field and the nuclei
   c) An unpaired electron and the proton
   d) An electron and the proton

5) The NMR technique deals with _____.
   a) Non-zero nuclear spins b) Zero nuclear spins
   c) With any nuclear spin d) None

6) Mössbauer effect is greater at lower temperatures because it depends on _____.
   a) Recoil free fraction of the total $\gamma - ray$ emitting atoms
   b) Doppler shift
   c) Isomer shift
   d) None

7) Induced polarization is applicable for _____ molecule.
   a) Polar b) Non polar
   c) Linear d) Nonlinear

8) The intensity of magnetization produced in material is called as magnetic _____.
   a) Induction b) Susceptibility
   c) Moment d) Permission

9) Compound A. has greater shielding constant than compound B. Which of them will have more chemical shift?
   a) Compound A
   b) Compound B
   c) Both will have equal chemical shifts
   d) Chemical shift has no relation with shielding constants

10) The HCl molecules possesses _____ ionic character.
   a) 50% b) 27%
   c) 20% d) 17%

B) Fill in the blanks OR write true/false **06**

1) The magnetic materials follow which law?
2) Debye equation is applicable for only.
3) The ESR spectrum of CH_3 radical shows _____ number of peaks.
4) The material which has negative value of susceptibility is _____.
5) Possible orientations do spin ½ nuclei have when they are located in an applied magnetic field.
6) The temperature below which the single Mössbauer line splits into six lines because of sharp decrease in electron density at the nucleus is called _____.

Q.2 Answer the following **16**

a) Write note on Lennard-Jones potential.
b) Write note on Van Vleck general equation of magnetic susceptibility.
c) Spin -spin relaxation.in NMR spectroscopy.
d) Doppler effect in Mössbauer.

Q.3 Answer the following

a) Discuss factors affecting chemical shift in NMR. **08**
b) Define diploe moment. Discuss vapour- temperature method for the determination of dipole Moment. **08**

Q.4 Answer the following

a) Discuss in detail the Gouy method of determining magnetic susceptibility. **08**
b) Discuss the various components of ESR spectrometer with schematic diagram. **08**
Calculate the "g" value of CH_3 radical which absorb at 0.329 T in spectrometer operating at frequency 9230 MHz. ($\beta = 9.273 \times 10^{-24} JT^{-1}, h = 6.626 \times 10^{-34} Js$)

Q.5 Answer the following

a) What is polar and non-polar molecules? Derice Clausius-Mossotti equation of molar polarization. **10**
b) Distinguish between ^{1}H and ^{13}C NMR spectroscopy. **06**

Q.6 Answer the following

a) Discuss the basic principles of ESR spectroscopy. **06**
b) Derive an expression for molar susceptibility using Langevin's theory of diamagnetism. **10**

Q.7 Answer the following

a) Describe interaction between spin and a magnetic field in NMR spectroscopy. **08**

b) Describe the working of a Mossbauer spectrometer with a neat sketch. **08**
If the energy of emitted γ-rays from the first excited state of Fe^{57} nucleus is 14.4 keV.
Calculate its recoil energy ($N = 6.023 \times 10^{23}, 1keV = 1.6 \times 10^{-19} J, c = 3 \times 10^{8} ms^{-1}$)

SLR-EF-50

Seat No.		Set	P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICAL CHEMISTRY
Surface Chemistry (MSC11408)

Day & Date: Thursday, 21-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any Three questions from Q.No.3 to Q.No.7.
3) Figures to the right indicate full marks.

Q.1 A) Choose the correct alternatives from the options. **10**

1) The temperature at which the atoms or molecules of the solid acquired sufficient energy for their bulk mobility and reactivity to become appreciable. This temperature is referred as _____.
   a) Kirkendell temperature b) melting point
   c) Tamman temperature d) Kraft temperature

2) In liquid-vapor, the curved interface is a part of circle of radius R_1, then according to Young and Laplace equation other principles radius of curvature R_2 is equal to _____.
   a) zero b) Infinity
   c) same as R_1 d) $1/R_1$

3) The nanoparticles are ____ dimensional.
   a) zero b) one
   c) two d) three

4) Emulsions are extensively used to formulate externally used products like ____.
   a) lotions b) liniments
   c) creams d) all the above

5) Entropy of micellization is _____.
   a) $\Delta S = 0$ b) $\Delta S < 0$
   c) $\Delta S > 0$ d) $\Delta S \leq 0$

6) For solid powders, fusion of adjacent particles occurs when the system, is heated to some temperature below the melting point. This process is called as ____.
   a) sintering b) fusion
   c) heating d) phase transition

7) When the angle of contact between a solid and a liquid is $90°$, then ____.
   a) Cohesive force $>$ Adhesive force
   b) Cohesive force $<$ Adhesive force
   c) Cohesive force $=$ Adhesive force
   d) Cohesive force $\gg$ Adhesive force

8) The protecting power of lyophilic colloidal sol is expressed in terms of __.
   a) CMC b) coagulation value
   c) oxidation number d) gold number

9) Factors that affect the surface energy are _____.
   a) friction b) corrosive action
   c) adsorption d) All of these

10) Which of the following colloids are solvent hating?
a) lyophilic b) lyophobic
c) hydrophilic d) hydrophobic

B) Fill in the blanks OR State true/false: **06**

1) All emulsions are stable. (True/False)
2) At critical micelle concentration, all properties of solutions of surfactants undergo dramatic change. (True/False)
3) The extent of adsorption depends upon the nature of adsorbent. (True/False)
4) Mercury on flat solid surface takes spherical shape. (True/False)
5) Does the ratio of surface area to volume affects the shape of the particles in sintering? Indicate yes or no
6) One can synthesis three dimensional nanoparticles.

Q.2 Answer the following. **16**

a) Discuss maximum bubble pressure method of determination surface Tension of liquids.
b) Explain the terms cohesion and adhesion energy of the liquids in terms of the surface tension.
c) Derive Herkins-Jura Equation.
d) Describe Bartell method of determination of contact angle made by the liquid with the solid surface.

Q.3 Answer the following.

a) Derive BET equation and explain its significance in determination surface area of solids. **08**
b) Write on Young and Laplace equation for vapor pressure at curved, plane and spherical interfaces. **08**

Q.4 Answer the following.

a) Deduce two dimensional ideal equations to describe physical states of monomolecular films of surfactant on liquid surfaces. **08**
At $20°C$ and a surface pressure of 0.10 dynes per cm, lauric acid occupies an area of $3100\ A^2$ per molecule on a water surface. Assuming the film to be a two dimensional ideal gas, calculate the gas constant in ergs per degree per mole.
b) Give a brief comment on the factors affecting adsorption. **08**

Q.5 Answer the following.

a) What is 'point B' method? Discuss determination surface area of the solids by using this method. **08**
b) Derive Langmuir adsorption isotherm and explain its advantages and disadvantages. **08**

Q.6 Answer the following.

a) Explain the term contact angle and its relation with the wetting of solid surface by the given liquid. Describe capillary rise method of determination of contact angle made by the liquid with the solid surface. **08**
b) Discuss positive and negative adsorption. **08**

Q.7 Answer the following.

a) Discuss in brief the theory and energetic of micellization. **08**
For sodium dedocyl sulphate the free energy of micellization is -5.3 kcal $mole^{-1}$ at 25°C. The calorimetric heat of micellization is 0.5 kcal $mole^{-1}$ Calculate entropy change of micellization.
b) Derive Gibb's adsorption equation with usual notations. **08**

SLR-EF-52

Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
ANALYTICAL CHEMISTRY
Advanced Separation Techniques (MSC013301)

Day & Date: Friday, 05-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) Solvent extraction is governed by _____.
   a) Boyle's law b) Beer's law
   c) Nernst's distribution law d) Ostwald's law

2) Solvent extraction is more effective when the extraction is repeated with ____.
   a) extra solvent b) small solvent
   c) large solvent d) no solvent

3) _____ technique is not a membrane separation technique.
   a) Ultra-filtration b) Reverse osmosis
   c) Micro-filtration d) Solvent extraction

4) In a chromatographic separation, _____ is most appropriate for the qualitative analysis of substance.
   a) tacking factor b) retention time
   c) capacity factor d) resolution

5) What are the driving forces in membrane separation?
   a) osmotic pressure b) partial pressure
   c) electrical field d) all of these

6) What is pore size of RO membranes?
   a) 0.0005μ b) 0.05μ
   c) 0.005μ d) 0.5μ

7) In normal phase HPLC, the mobile phase is _____ in nature.
   a) polar b) non-polar
   c) isolated d) carbonated

8) In size exclusion chromatography, solute molecules are separated, based on _____.
   a) molecular size & geometry b) molecular phase
   c) molecular composition d) molecular formula

9) _____ technique separates charged particles using electric field.
   a) Hydrolysis b) Electrophoresis
   c) Protein synthesis d) Protein denaturing

10) Electrodialysis is used, when impurities in a sol are _____.
   a) amphiphiles b) electrolytes
   c) colloids d) non-electrolytes

B) Write true or false. **06**

1) Calixarenes are supramolecular compounds with high molecular weights.
2) The column efficiency in HPLC is judged by counting theoretical plates.
3) The dextran gels are obtained by cross-linking the polysaccharide dextran's with epichlorohydrin.
4) Whatmann filter papers are commonly used in solvent extraction for separation.
5) Counter current extraction is pioneered by Gibbs.
6) Ultrafiltration is a variety of membrane filtration in which hydrostatic pressure forces a liquid against a semi permeable membrane.

Q.2 Answer the following. **16**

a) Explain in brief electro osmotic flow.
b) Write a short note on solvent extraction by using crown ethers and cryptands.
c) Give an account on principle and applications of zone refining.
d) Explain the applications of high-performance liquid chromatography.

Q.3 Answer the following. **16**

a) Describe in detail the ultra-filtration technique.
b) Discuss in detail the principle, experimental procedure and application of capillary electrophoresis.

Q.4 Answer the following. **16**

a) Explain in detail the principle and process of zone refining.
b) Discuss electrophoresis process with its theory and applications.

Q.5 Answer the following. **16**

a) Explain in detail the theory and techniques of solvent extraction.
b) Discuss solid phase extraction (SPE) and applications of solvent extraction.

Q.6 Answer the following. **16**

a) Which gels are commonly used in gel permission chromatography? What are the roles of ligand and spacer arms in gel permission chromatography.
b) Explain the principle, theory and technique of high-performance liquid chromatography.

Q.7 Answer the following. **16**

a) Discuss the principle of affinity chromatography. Describe the components involved in affinity medium.
b) i) Explain in short extraction by chelation.
ii) Give the applications of dialysis.

SLR-EF-53

Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
Analytical Chemistry
Instrumental Methods of Analysis- I (MSC013302)

Day & Date: Sunday, 07-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Question 1and 2 are compulsory.
2) Attempt any Three from Q.3 to Q.7.
3) Figure to right indicate full marks.

Q.1 A) Multiple choice questions **10**

1) Becquerel discovered radioactivity by using _____.
   a) Photographic film b) radiations damages on skin
   c) GM-Counter d) cloud chamber NaF

2) The cell employed for high frequency titrations is a _____ vessel which acts as conductivity cell.
   a) Glass/Silica b) Glass
   c) Quartz/Silica d) Glass/ceramic

3) Electrogravimetry is similar to _____.
   a) Electroplating b) Dapping
   c) Gravimetry d) Potentiometry

4) The self-sustaining nuclear fission reaction depends on the release of _____
   a) Energy b) Protons
   c) Neutrons d) Electrons

5) _____ Is most appropriate to study polymorphism.
   a) DTA b) TGA
   c) DTGA d) DSC

6) _____ radio isotope used in medical applications.
   a) Iodine-131 b) Cobalt-60
   c) Technetium-99m d) All of these

7) _____ parameter can be used in DSC and DTA cells.
   a) Catalytic properties of enzymes
   b) Elasticity of crystals
   c) Enthalpy of substances
   d) Line positions of phases

8) _____ Is used for quantitative determination of ions in solutions.
   a) Voltammetry b) Amperometry
   c) Conductometry d) Potentiometry

9) Amperometric sensor was developed in 1956 by L.C.Clark to measure dissolved _____ in blood .
   a) N_2 b) CO
   c) H_2 d) O_2

10) A controlled-current coulometric method is also called as _____.
   a) Potentiometric titration b) Coulometric titration
   c) Electrogravimetric titration d) Redox titration

B) Fill in the blanks OR write true/false. **06**

1) Electrogravimetric method is applicable only to materials that are conductors of electricity.
2) When titration involve radiactive reagent, it is called as radiometric titration.
3) Ion selective electrodes have lower and higher linear range detection limit than pH electrode.
4) In thermogravimetric analysis, the result obtained appears as a continues parabola.
5) Calomel electrode is not a reference electrode.
6) In liquid membrane electrode, the liquid ion exchanger is held in a porous disc of hydrophobic material

Q.2 Answer the following. **16**

a) Write a short note on dead stop end point method.
b) Give Randles - Sevic equation and explain various terms in it.
c) Draw the typical cyclic voltammogram and show peak voltages and peak currents.
d) Write a note on radio chromatography.

Q.3 Answer the following.

a) Differentiate the constant current and constant potential coulometry. **08**
b) Enlist various types of the ion selective electrodes. Explain construction and working of the glass electrode. **08**

Q.4 Answer the following.

a) Explain how nuclear α, β and γ radiations differs from each other. **08**
b) What are radioactivity tracers? Discuss its applications in various fields. **08**

Q.5 Answer the following.

a) Describe the basic principles of cathodic / anodic stripping voltammetry. **08**
b) What are the main material components needed in the design of a polymer based ion selective membrane? Describe the role of each component in detail. **08**

Q.6 Answer the following.

a) Give the principle of DSC technique. Explain endothermic and exothermic DSC peaks with suitable example. **08**
b) Discuss the difference between the thermal methods: TGA and DTA **08**

Q.7 Answer the following.

a) Explain how differential thermal analysis technique helps in determining melting point, boiling point and decomposition point. **08**
b) Describe various applications of the high frequency titrations. **08**

SLR-EF-54

Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
ANALYTICAL CHEMISTRY
Applied Analytical Chemistry (MSC013306)

Day & Date: Tuesday, 09-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. (MCQ) **10**

1) Soil contains _____.
   a) water, air b) organic matter
   c) Inorg. matter d) all of these

2) The percentage of copper present in bronze _____.
   a) 88 b) 30
   c) 50 d) 100

3) _____ is name of iron ore.
   a) bauxite b) hematite
   c) dolomite d) brass

4) _____ elements are estimated by volumetric method.
   a) mg b) Al
   c) Boric acid d) All of these

5) Neutral soil having pH = _____.
   a) 7 b) 4
   c) 8 d) 11

6) Generally alloy is _____ mixture of two or more metals.
   a) b)
   c) d)

7) For estimation of Aluminum from bauxite _____ reagent is used.
   a) quinhydrone b) quinoline
   c) 8-hydroxy quinoline d) none of these

8) Phenol reacts with bromine to give _____ bromo derivative.
   a) di b) mono
   c) tetra d) tri

9) During plant analysis triacid digestion method is used for estimation of _____ element.
   a) B & S b) P & K
   c) C & H d) N & Na

10) _____ is example of alloy.
   a) Bronze b) $ZnSO_4$
   c) $CuSO_4$ d) $FeCl_3$

B) Fill in the blanks: **06**

1) Fe_2O_3 is chemical formula of _____.
2) _____ method is used to estimate hexachlorophene.
3) In colorimetric estimation of phosphorous from plant sample _____ nm filter is used.
4) _____ method is used for estimation of N from soil.
5) Solder alloy contains _____ & _____ elements.
6) Any substance which apply to body to promote appearance of person is called as _____.

Q.2 Write short notes. **16**

a) physical properties of soil.
b) Fertilizer
c) Analysis of iron from its ore.
d) Detection of carbonates, chlorides, TiO_2 and non wlathle matter.

Q.3 Answer the following.

a) Write experimental procedure for estimation of total nitrogen from plant. **16**
b) Describe soil temperature. Explain different factors that affects on soil temperature.

Q.4 Answer the following. **16**

a) Write the experimental method to estimate mn & Cu from steel alloy.
b) Explain analysis of Sn & pb from solder alloy.

Q.5 Answer the following. **16**

a) Define insecticide and pesticide. Give detail method for calculator of nitrogen from fertilizer.
b) How will you calculate potassium in fertilizer. Explain alkalimetric ammonium molybdophosphate method for analysis of phosphorus in fertilizer.

Q.6 Answer the following. **16**

a) How will you estimate Ca & fe from deodorant.
b) How will you estimate fats & fatty acid by volumetric method. How will you estimate phenol from sample.

Q.7 Answer the following. **16**

a) Give detail method of plant analysis for starch and sugar.
b) Explain classification of insecticides and how will you estimate DDT.

SLR-EF-56

Seat No.		Set	P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
ANALYTICAL CHEMISTRY
Advanced Analytical Techniques (MSC013401)

Day & Date: Monday, 18-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to the right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) In FIA dispersion of sample is seen by _____.
   a) diffusion b) conversion
   c) osmosis d) convection and diffusion

2) In LC-MS _____ is the most commonly used interface.
   a) chopper b) nebulizer
   c) vapoursing chamber d) filter

3) In ion chromatography suppressors used in anion analysis is a _____.
   a) anion exchanger b) cation exchanger
   c) neutral d) all of these

4) In SFC mobile phase affinity for the analyte is a function of _____.
   a) mobile phase density b) mobile phase solubility
   c) mobile phase viscosity d) all of these

5) In GC-MS ion intensity is measured with _____.
   a) intensity meter b) ion meter
   c) ion transducer d) electrometer

6) The critical temperature is that temperature above which the _____ phase cannot exit.
   a) solid b) liquid
   c) gas d) None of these

7) GS-MS uses _____ column system.
   a) capillary column b) open tabular column
   c) porous layer column d) packed column

8) Critical point of CO_2 gas is _____.
   a) 0.47 b) -0.45
   c) 0.24 d) -0.40

9) Which of pump is required in flow injection analysis?
   a) syringe b) reciprocating
   c) peristatic d) all of these

10) _____ is the normal nebulizer temperature used in LC-MS.
   a) 125- 150 °C b) 25- 50 °C
   c) 100- 150 °C d) 250-300 °C

B) Write True/False. **06**

1) An FIA curve is a plot of the detection signal as a function of temperature.
2) In flow injection analysis the peak heights are influenced by dispersion of sample.
3) The nebulizer gas and make up gas are introduced coaxially into the heated nebulization region.
4) At a temperature and pressure above its critical point a substance is called as super critical fluid.
5) SFC is superior to GC and HPLC.
6) Gas chromatography provides direct identification of compound.

Q.2 Answer the following. **16**

a) Advantages of automation.
b) Properties of super critical fluids.
c) Environmental speciation by ion chromatography.
d) Atomic spectrometric detection.

Q.3 Answer the following. **16**

a) Explain in brief basic instrumentation and Interfaces of LCMS.
b) Explain the structure of resins used in ion chromatography.

Q.4 Answer the following. **16**

a) Explain in brief instrumentation of super critical fluid chromatography.
b) Explain in brief automated analyzer based on multilayer film principle and its instrumentation.

Q.5 Answer the following. **16**

a) Explain the principle of ion chromatography and its applications.
b) Explain the HPLC-MS technique and its applications.

Q.6 Answer the following. **16**

a) Explain in brief instrumentation of ion chromatography.
b) Explain in brief GC-MS technique.

Q.7 Answer the following. **16**

a) Explain in brief automatic elemental analyzer.
b) Discuss the structure determination of biopolymers.

SLR-EF-57

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
ANALYTICAL CHEMISTRY
Instrumental Methods of Analysis - II (MSC013402)

Day & Date: Tuesday, 19-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternatives. **10**

1) _____ is the radiative transition.
   a) Fluorescence b) phosphorescence
   c) delayed fluorescence d) All of these

2) Fluorescence is always occurs at _____ than the excitation wavelength.
   a) higher wavelength b) lower wavelength
   c) same wavelength d) None of these

3) _____ are the variables that affect the value of refractive index.
   a) Temperature b) Pressure
   c) Wavelength d) All of these

4) Which of the following system shows chemiluminescence phenomenon?
   a) luciferin b) luminol
   c) aequorin d) All of these

5) Which of the following principle is the basis of Abbe's refractometer?
   a) pogendorff s compensation b) critical angle
   c) null deflection d) all of these

6) The good oxidants to excite metals in the flame is _____.
   a) oxygen b) cyanogens
   c) butane d) hydrogen

7) The smallest interplanar spacing in a crystal which will give the nth order Bragg reflection is _____.
   a) $d_{hkl} = n$ b) $d_{hkl} = n/2$
   c) $d_{hkl} = n/3$ d) $d_{hkl} = n/4$

8) In a series of aromatic compounds, the most fluorescent are _____.
   a) rigid b) non planar
   c) sterically crowded d) All of these

9) The temperature of acetylene-oxygen flame is _____ °C.
   a) 2400 b) 3400
   c) 3000 d) 2700

10) The X-ray region of the electromagnetic spectrum consists of wavelengths in the region of _____.
   a) $0.1 - 100$ Å b) $100 - 1000$ Å
   c) $0.0001 - 0.001$ Å d) $0.1 - 100\ cm$

B) Fill in the blanks OR Write true/false **06**

1) The Bragg's equation is written as $n\lambda =$ _____.
2) Fluorescence emission is observed mainly due to the $\pi \rightarrow \pi *$ transition. (True / False)
3) The mathematical formula for specific refractivity is _____.
4) Room temperature phosphorescence is very weak. (True / False)
5) Elements having atomic number less than 23 produce only _____ series.
6) The mathematical equation for Beer-Lambert's law is given as _____.

Q.2 Answer the following **16**

a) Explain Components of spectrofluorimeter.
b) Give the applications of turbidimeteric method.
c) Describe the burners used in flame photometry.
d) Write a note on instrumentation of interferometer.

Q.3 Answer the following **16**

a) Write in detail on chemiluminescence phenomenon.
b) Discuss different excitation sources used in emission spectroscopy.

Q.4 Answer the following **16**

a) With the help of Jablonski energy level diagram, illustrate various photophysical pathways.
b) Explain how X-rays can be produced.

Q.5 Answer the following **16**

a) Explain spectral and chemical interference encountered in flame photometry.
b) What do you meant by solid surfaces? How sampling of surfaces can be done?

Q.6 Answer the following **16**

a) Write on different excitation sources used in emission spectroscopy.
b) Describe X-ray fluorescence technique.

Q.7 Answer the following **16**

a) Write on the instrumentation of Nephelometry.
b) Explain the principle and working of Abbe's refractometer.

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Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
ANALYTICAL CHEMISTRY
Biochemical and Food Analysis (MSC013403)

Day & Date: Wednesday, 20-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

Q.1 A) Multiple choice questions. **10**

1) Mineral oils are obtained from _____ by distillation.
   a) crude petroleum b) plants
   c) oils d) glycerides

2) Components of whole blood are _____.
   a) Plasma & serum
   b) Cellular elements
   c) Plasma & cellular elements
   d) None of these

3) Non-steroidal anti-inflammatory drug is _____.
   a) adrenaline b) ibuprofen
   c) cinobarbitone d) barbutaric acid

4) The term LD stands for _____.
   a) lethal dose b) lethal dangerious
   c) local death d) local dose

5) Food preservation is classified as _____.
   a) artificial b) natural
   c) chemical d) All of these

6) Normal range of total bilirubin is _____.
   a) 1.0 mg/dl b) 0.5 mg/dl
   c) 1.5 gm/dl d) 0.7 g/dl

7) Fenfluramine hydrochloride is _____ stimulant.
   a) DDT b) CNS
   c) DDP d) diazepam

8) _____ is not a type of poison.
   a) Gas b) Inorganic
   c) Organic d) Alkaloid

9) _____ is used as saponifying alkali.
   a) $Ca(OH)_2$ b) NH_3
   c) KOH d) $Mg(OH)_2$

10) Hemoglobin in blood carries _____.
   a) oxygen from lungs b) releases oxygen
   c) to provide energy d) All of these

B) Fill in the blanks. **06**

1) Substance used for diagnosis, Prevention, relief or cure of some disease in man or animal is _____.
2) Deficiency of vitamin A causes _____.
3) Indicator used to determine hardness of water is _____.
4) Hemoglobin mainly contains _____ element.
5) _____ chromatographic method is used for drug screening.
6) Vitamin c is known as _____ acid.

Q.2 Write short notes on. **16**

a) Classification of drugs.
b) Determination of bilirubin in blood
c) Classification of oils.
d) Function of insulin.

Q.3 a) Why food preservation is essential? Give their classification. **08**
b) How will you determine Na & Cl from urine sample? **08**

Q.4 a) Give qualities of ideal drug. **08**
b) Explain the procedure for analysis of blood glucose. **08**

Q.5 a) How will you estimate nitrogen from sample by kjeldahl's method? **08**
b) How will you estimate glucose & urea from blood. **08**

Q.6 a) Give example & explain characteristics & analysis of anticonvulsant i.e phenytoin. **08**
b) Write essay on snake venom. **08**

Q.7 a) 1) How will you determine saponification value of oil. **08**
2) How will you determine phosphate from blood sample.

b) 1) Give difference between drug & medicine. **08**
2) Explain in brief vitamin C.

SLR-EF-60

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
ANALYTICAL CHEMISTRY
Pharmaceutical Analysis (MSC013409)

Day & Date: Thursday, 21-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) Ointments are used for external applicant to _____.
   a) eye b) ear
   c) skin d) All of these

2) In pharmaceutical industries, the impurities are may be due _____.
   a) chemical instability b) manufacturing process
   c) raw material d) All of the above

3) The dry sterilization process is carried out in _____.
   a) incubator b) oven
   c) cooker d) thermostat

4) Ash is remaining residue after _____.
   a) ignition b) sterilization
   c) incubation d) drying

5) In dissolution test normal rotation speed is ____.
   a) 80 rpm b) 120 rpm
   c) 200 rpm d) 280 rpm

6) Solutions are _____dosage form.
   a) solid b) monophasic
   c) biphasic d) triphasic

7) Disodium EDTA is an example of _____.
   a) sweetening agent b) flavouring agent
   c) chelating agent d) preservative

8) Light sensitive material should be stored in _____ vessels.
   a) valcanised b) metallic
   c) plastic d) darkened glass

9) Hard gelatin capsule contains _____ % of moisture.
   a) 12-14% b) 11-15%
   c) 10-13% d) 13-16%

10) For the analysis of aspirin, _____ indicator is used.
   a) starch b) bromothymol blue
   c) phenolphthalein d) malachite green

B) Fill in the blanks & rewrite the sentences. **06**

1) Arsenic is converted into arsine gas when it is passed over _____.
2) Buffering agent is also called as _____.
3) Saccharin is an example of _____.
4) GLP stands for _____.
5) In capsule, inner substance is enclosed with small shell which is generally prepared from _____.
6) The Karl Fisher reagent assembly contain _____ electrode.

Q.2 Answer the following **16**

a) Explain procedure for determination of ash in ginger.
b) Explain pills in details.
c) Explain injections with suitable example.
d) Write a note on liquid dosage form.

Q.3 Answer the following

a) Discuss role of manitol in injection and role of salicylic acid in mouth wash. **10**
b) Explain in detail dissociation test. **06**

Q.4 Answer the following

a) What is FDA? Discuss in detail how FDA control pharmaceutical and cosmetic Industries? **10**
b) 0.32 gm of paracetamol [C_8 F_9 NO_2] was dissolved in 30 ml 2 N H_2 SO_4. This solution was titrated with 0.1 N cerric ammonium sulphate using ferroin sulphate indicator gave a burette reading 8.1 ml. Calculate the percentage of paracetamol. [At. Wt.: C-12, H-1, O-16, N-14]. **06**

Q.5 Answer the following

a) Discuss in detail ophthalmic preparation in dosage form. **10**
b) What is tablet? Describe different types of tablet. **06**

Q.6 Answer the following

a) Describe in detail chemical test for arsenic. **08**
b) 0.314 gm benzocaine [C_9 H_{11} NO_2] dissolved in mixture of 25 ml HCl and 50 ml distilled water. After cooling this solution to 15°C titrate with 0.095 N $NaNO_2$ gave burette reading 12,2 ml. Calculate percentage of benzocaine in the given sample. [At. Wt.: C-12, H-1, O-16, N-14]. **08**

Q.7 Answer the following

a) What is ash value? How sulphated ash is determined for vegetable drug sample? **08**
b) What is Karl-Fisher? How it prepared and standardized? **08**

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Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
PHARMACEUTICAL CHEMISTRY
Advanced Organic Chemistry – I (MSC012301)

Day & Date: Friday, 05-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative (MCQ) **10**

1) In Sandmeyer reaction the intermediate compound formed before adding cuprous halide is _____.
   a) Alcohol halide b) Diazonium halide
   c) Aqueous halide d) None of the mentioned

2) In Henry reaction the product formed is _____ nitro compound.
   a) α-Hydroxy b) γ-hydroxy
   c) β - hydroxy d) δ-hydroxy

3) Intermediate formed in Wagner-Meerwein rearrangement is _____.
   a) Carbene b) Carbanion
   c) Carbocation d) nitrene

4) Peracids react with alkene to give _____ rings containing one oxygen atom.
   a) five membered b) three membered
   c) six membered d) four membered

5) Oxidation of allylic C-H fragments with SeO_2 gives _____.
   a) allylic aldehydes b) allylic ketones
   c) allylic alcohols d) allylic acids

6) Conversion of oxime tosylate to α-aminoketones is known as _____ rearrangement.
   a) Pyne b) Smiles
   c) Steven d) Neber

7) Formylation of phenols or amines with hexamine is known as _____.
   a) Darzen reaction b) Heck reaction
   c) Henry reaction d) Duff reaction

8) Ozonolysis of 2-butene followed by reduction with zinc and water gives _____.
   a) two acetaldehyde b) two formaldehyde
   c) two acetone d) two butanol

9) Bamford-Stevens reaction product formed is _____.
   a) alkane b) alkene
   c) alkyne d) aldehyde

10) In Hunsdiecker reaction _____.
   a) number of carbon atoms decrease
   b) number of carbon atoms increase
   c) number of carbon atoms remains same
   d) carboxylic acid is formed

B) Write the answer with one sentence. **06**

1) What the role of NBS in free radical reactions?
2) What is the use of SeO_2 in organic synthesis?
3) What is IUPAC name of pinacol?
4) What is the functional group of peracids?
5) Which alcohol is transformed in Payne rearrangement?
6) Which catalyst is used in Darzen reaction?

Q.2 Answer the following. **16**

a) Write note on oxidation of aldehydes to carboxylic acids.
b) Explain McMurry reaction.
c) Explain Sandmeyer reaction.
d) Write note on organotin reagents.

Q.3 Answer the following. **16**

a) Explain reactivity for aliphatic and aromatic substitution at a bridge head.
b) Explain Wagner-Meerwein rearrangement reaction and Wolf rearrangement

Q.4 Answer the following. **16**

a) Explain Stille rearrangement and Heck rearrangement reactions.
b) How trimethylsilyl iodide is prepared? Write its four applications.

Q.5 Answer the following. **16**

a) Explain the coupling of alkynes and arylation of aromatic compounds by diazonium salt.
b) Write note on PPA and Peracids.

Q.6 Answer the following. **16**

a) Explain Neber and Smiles rearrangement reactions.
b) Explain the Prins and Henry reaction.

Q.7 Answer the following. **16**

a) Explain iodolactonisation and Wittig rearrangement.
b) Explain the Julia olefination and Suzuki reaction.

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Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
Pharmaceutical Chemistry
Chemistry of Bioactive Heterocycles (MSC012302)

Day & Date: Sunday, 07-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any Three questions from Q.No.3 to Q.No.7.
3) Figures to the right indicate full marks.

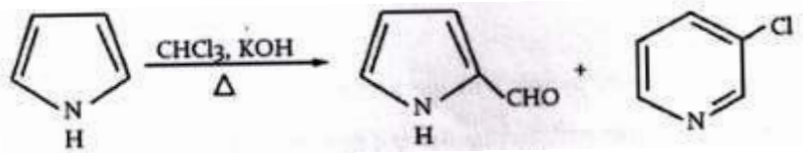
Q.1 A) Choose correct alternative. **10**

1) Which of the following is a not a five membered ring?
   a) Pyridine b) Pyrrole
   c) Furan d) Thiophene

2) Which of the following five membered rings is most resonance stabilized?
   a) Furan b) Thiophene
   c) Pyrrole d) Pyridine

3) What is the reactivity order in the following five membered heterocyclic compounds?
   a) Pyrrole b) Furan
   c) Thiophene d) Pyridine

4) What is the name of the following reaction?



   a) Gattermann reaction b) Riemer tiemann reaction
   c) Friedal craft reaction d) Blanc's chloromethylation

5) Oxidation of Isoquinoline with KMnO4 gives _____as one of the products.
   a) Benzoic acid b) Pyridine
   c) Phthalic acid d) Salicylic acid

6) Electrophilic aromatic substitutions in quinoline takes place at _____ positions.
   a) 4 b) 2
   c) 5 and 8 d) 2 and 4

7) 2- Aza naphthalene is the name of _____.
   a) Pyridine b) quinoline
   c) Isoquinolined d) indole

8) Quinoline is _____ compound.
   a) Homocyclic b) Heterocyclic
   c) Aliphatic d) Saturated

9) Thiophene cannot be prepared from _____.
   a) acetylene b) n-butane
   c) ethylene d) sodium succinate

10) Furan on reaction with $CHCl_3$/KOH gives _____.
   a) 2-acetyl furan b) Furfural
   c) 3-acetyl furan d) 2-chloro furan

B) Fill in the blanks. **06**

1) Pyridine has delocalized Pi-molecular orbital containing _____.
2) Furan containing _____functional group is known as furfural.
3) Thiophene is _____membered heterocyclic compound.
4) Isoquinoline on reaction with soda amide in liq. Ammonia gives____.
5) Pyrrol on heating with methyl chloride in presence of sodium methoxide _____formed.
6) Pyrazine contain _____nitrogen atom.

Q.2 Answer the following. **16**

a) Discuss aromaticity of pyrrole and thiophene.
b) Write any two methods of preparation of furan.
c) What is pyridine? Why pyridine is basic in nature.
d) Write a note on morphine.

Q.3 Answer the following. **16**

a) Discuss the synthesis of thiophene and pyrrole with mechanism.
b) Write note on synthesis of benzofuran with mechanism and their applications.

Q.4 Answer the following. **16**

a) Discuss the synthesis of indole with mechanism and their chemical reactions.
b) Discuss the synthesis of imidazole and pyrazole and their applications.

Q.5 Answer the following. **16**

a) Discuss synthesis of benzothiophene with mechanism and their chemical reactions.
b) What is quinolone and is quinoline? Write synthetic methods with examples.

Q.6 Answer the following. **16**

a) Write a detail note on aziridine and oxirane with examples.
b) Discuss the synthesis of azitidine and thietane with chemical reactions.

Q.7 Answer the following. **16**

a) Discuss the synthesis and tetrazine in detail.
b) Write mechanism of Coumarin and Chromene with chemical reactions.

SLR-EF-72

Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
PHARMACEUTICAL CHEMISTRY
Drug Development (MSC012306)

Day & Date: Tuesday, 09-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) Among the following _____ is a fastest receptor.
   a) Enzyme linked b) Ion-gated
   c) GPCR d) Nuclear

2) The computer simulation refers to _____
   a) Dry lab b) Invitro
   c) In silico d) Wet lab

3) The study of _____ refers to Proteomics.
   a) Set of proteins in a specific region of the cell
   b) Biomolecules
   c) Set of proteins
   d) The entire set of expressed proteins in the cell

4) The computational methodology that tries to find the best matching between two molecules, a receptor and ligand are called _____.
   a) Molecular fitting b) Molecular matching
   c) Molecular docking d) Molecule affinity checking

5) The substances used in medicine to exert a particular therapeutic effect are collectively known as _____
   a) Excipients b) Fats
   c) Proteins d) Drugs

6) Drugs are excreted from the body through _____.
   a) Kidney b) Breast milk, saliva, sweat & bile.
   c) Intestine d) All of the above

7) Which of the following approach is considered as the ‘Ligand based drug designing’?
   a) Molecular docking b) Pharmacophore modelling
   c) QSAR Modelling d) both b and c

8) For the calculation of volume of distribution (Vd), one must take into account _____
   a) Concentration of drug in urine
   b) Therapeutic range of drug action
   c) A daily drug dose
   d) Concentration of drug in plasma

9) which is concerned with the study of mechanism of action of drug and pharmacological effects produced on the human body The science is known as _____.
   a) Pharmacokinetics b) Toxicology
   c) Pharmacology d) Pharmacodynamics

10) The rate of absorption of a drug is affected by _____.
   a) Route of drug administration
   b) Solubility of the drug
   c) Site of administration
   d) All of the above

B) Fill in the blanks. **06**

1) In QSAR equation, _____ is represented by the symbol 'P'.
2) A measure of the fraction of administered dose of a drug that reaches the systematic circulation in the unchanged form is called as _____.
3) _____ developed the first protein sequence database.
4) The combined effect of two drug effect is higher than either individual effect is called as _____.
5) Minimum concentration of drug needed to produce desired pharmacologic effect is called as _____.
6) A compound that acts as the starting point for drug design and development is called as _____ compound.

Q.2 Answer the following. **16**

a) Explain the concept of drugs and its sources.
b) Write a note on Therapeutic Index (TI).
c) Discuss the types of molecular descriptors.
d) What are pro-drugs and soft drugs?

Q.3 Answer the following. **16**

a) Explain the Lipinski rule of five and discuss different types of receptors.
b) Explain in detail the combined effect of drugs administered together in the body.

Q.4 Answer the following. **16**

a) Explain in detail Structure -based drug designing.
b) Explain pharmacokinetic as well as pharmacodynamics parameters with the help of the plasma drug concentration-time profile.

Q.5 Answer the following. **16**

a) Discuss the physicochemical properties of the molecules.
b) Write an account on metabolism for the drug administered in the body.

Q.6 Answer the following. **16**

a) What is dose-response relationship? Explain the potency and efficacy of the drug.
b) What are the principles of drug action? Discuss the mechanism involved in drug action.

Q.7 Answer the following. **16**

a) What is pharmacokinetics? Explain the process of drug absorption.
b) Define and classify molecular docking and discuss various steps involved in the flexible docking.

SLR-EF-74

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
PHARMACEUTICAL CHEMISTRY
Photochemistry and Pericyclic Reactions (MSC012401)

Day & Date: Monday, 18-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) Comparing to starting and final products for sigmatropic reactions ____.
   a) σ and π bond remains same
   b) one σ bond less
   c) one π bond less
   d) σ and π bond increases

2) Norrish type II reaction involves intramolecular _____ hydrogen abstraction.
   a) β b) γ
   c) δ d) α

3) In photochemical reactions, absorption of _____ radiations takes place.
   a) Ultraviolet and visible b) Radio
   c) Only visible d) visible and x-rays

4) Electrocyclic reaction of 1, 3 butadiene gives the product _____.
   a) butane b) cyclopropene
   c) cyclobutene d) cyclodutadiene

5) In photochemical reaction of ketones, by Norrish type I there is elimination of _____.
   a) CO_2 b) H_2O
   c) NH_3 d) N_2

6) Cope rearrangement reaction is type of _____ reaction.
   a) sigmatropic b) cycloaddition
   c) electrocyclic d) ene

7) A place of zero electron density between the atoms is called as _____.
   a) phase b) bonding
   c) node d) orbital

8) In cycloaddition reaction two π bonds are converted into _____.
   a) One π and one σ bond b) One π bond
   c) One σ bond d) Two σ bonds

9) Diel's Alder reaction is type of _____.
   a) sigmatropic reaction b) electro cyclic reaction
   c) ene reaction d) cycloaddition reaction

10) In Paterno-Buchi reaction product synthesised is _____ ether ring.
a) three membered b) four membered
c) five membered d) six membered

B) Write the answer with one sentence. **06**

1) What is meant by photochemistry?
2) What is reverse of cycloaddition reaction?
3) What is conrotation?
4) Which molecular orbitals are formed by combining two atomic orbitals?
5) What is photodimerisation?
6) Which electrons are involved in pericyclic reactions?

Q.2 Answer the following **16**

a) Explain degenerate cope rearrangement.
b) Write note on photo dimerization of benzene.
c) Explain Diels-Alder reaction.
d) Write note on Barton reaction.

Q.3 Answer the following. **16**

a) Explain photochemistry of alkyl peroxides and hypohalites.
b) Explain calculation of energies of orbitals in cyclic systems.

Q.4 Answer the following. **16**

a) Explain electrocyclic closure and opening in 4n+2 systems.
b) Explain Woodward-Hoffmann selection rule for cycloaddition reaction.

Q.5 Answer the following. **16**

a) Explain symmetry properties in ethylene and 1,3-butadiene.
b) Explain Norrish type-I reaction in cyclic ketones and strained cycloalkanediones.

Q.6 Answer the following. **16**

a) Write note on photodecarboxylation and ene reaction.
b) Explain Conservation of orbital symmetry and orbital symmetry correlation diagram.

Q.7 Answer the following. **16**

a) Explain Huckel-Mobius aromatic and antiaromatic transition state method.
b) Write note on PMO theory and reactivity index.

SLR-EF-75

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
PHARMACEUTICAL CHEMISTRY
Advanced Organic Chemistry - II (MSC012402)

Day & Date: Tuesday, 19-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. (MCQ) **10**

1) Which of the following would NOT be used as a carbocation synthon?
   a) Grignard reagent b) Amide
   c) Alcohol d) Alkyl halide

2) In the case of alcohols the hydroxyl group may be protected by formation of _____.
   a) an ether b) an ester
   c) an acetal d) all of the above

3) Molecular formula of decalin is _____.
   a) $C_{10}H_{16}$ b) $C_{10}H_{18}$
   c) $C_{10}H_{14}$ d) $C_{10}H_{20}$

4) In crams rule, hydroxyl group is placed between the _____& _____ group.
   a) Medium, large b) Medium, small
   c) Large, small d) Large, carbonyl

5) In carbonyl condensation reactions, one of the reactants which must possess _____.
   a) gama hydrogen atom b) delta hydrogen atom
   c) beta hydrogen atom d) an alpha hydrogen atom

6) The 9-methyl-cis-decalin has _____ gauche-butane interactions.
   a) two b) three
   c) four d) five

7) Asymmetric synthesis involves conversion of _____ center to chiral center along with product selectivity.
   a) prochiral b) achiral
   c) chiral d) racemic

8) Decalin is also called as _____.
   a) bicyclo[4.4.0]decane b) bicyclo[0.0.4]
   c) bicyclo[4.0.0] d) bicyclo[4.4.4]

9) Carboxylic acids by protecting with alcohol give _____.
   a) anhydride b) ketone
   c) cyanide d) ester

10) Robinson annulation is _____.
   a) Michael followed by Aldol b) Aldol followed by Michael
   c) Mannich followed by Aldol d) Aldol followed by Mannich

B) Write the answer with one sentence. **06**

1) In carbonyl condensation reactions how many carbonyl containing reactants takes place?
2) Which are the good protecting groups for aldehydes?
3) What is the measurement of purity used for chiral substances?
4) Which type of decalin can flip?
5) What is the meaning of annulation?
6) What is C-X disconnection?

Q.2 Answer the following. **16**

a) Write note on reversal of polarity.
b) Differentiate between chemo selectivity and regioselectivity.
c) Write note on Bredts rule.
d) Write note on nomenclature of stereo chemical restrictions.

Q.3 Answer the following. **16**

a) Explain stability and reactivities in Cis- and trans- decalins.
b) Explain diastereo-selectivity in crotyl boronate and hydroboration.

Q.4 Answer the following. **16**

a) Explain protection and deprotection of carbonyls in aldehydes and ketones.
b) Write the use of chiral auxiliaries, chiral reagents and catalysts.

Q.5 Answer the following. **16**

a) In one group C-C disconnections write use of acetylenes and aliphatic nitro compounds in organic synthesis.
b) Explain asymmetric epoxidation and asymmetric dihydroxylation.

Q.6 Answer the following. **16**

a) Explain protection and deprotection in amines and carboxylic acids.
b) Write note on 1, 3 difunctionalized compounds and α,β-unsaturated compounds.

Q.7 Answer the following. **16**

a) Explain stability and reactivities in perhydraphenanthrene and perhydroanthracene.
b) Write note on Michael addition and Robbinson annulation.

SLR-EF-76

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
PHARMACEUTICAL CHEMISTRY
Pharmaceutical Dosage Forms (MSC012403)

Day & Date: Wednesday, 20-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

Q.1 A) Multiple choice questions. **10**

1) Which of the following is not a semisolid dosage form?
   a) Paste b) Creams
   c) Ointments d) Syrup

2) What is the drawback of parental controlled release system?
   a) Injecting is a difficulty
   b) The drug cannot be easily removed once administered
   c) Can get easily precipitated in the injection site
   d) rapid onset but fast excretion

3) Pre-formulation is about ensuring.
   a) Stability b) Safety
   c) Efficacy d) all of these

4) Rate of sedimentation is high in _____suspension.
   a) flocculated b) deflocculated
   c) both a and b d) none of these

5) In the preparation of vanishing creams, which types of bases are used generally?
   a) Water removable bases b) Absorption bases
   c) Hydrocarbon bases d) None of the above

6) Which of the following is an ideal characteristic of any pharmaceutical drug/excipient?
   a) Non-toxic b) Chemical inertness
   c) Water soluble d) All of the above

7) ____is not component of the aerosol system.
   a) Propellant b) Dip tube
   c) Actuator d) Paddle

8) Drug is _____.
   a) Any chemical compound
   b) Substance which alter physiological function
   c) Substance which cure disease
   d) All of these

9) Which drug delivery system has longest duration of action?
   a) Nasal preparation b) Implants
   c) Depot injection d) Transdermal patch

10) Rate determining step for controlled release drug delivery system is _____.
   a) Drug release from dosage form
   b) Absorption
   c) Both a and b
   d) Only a

B) Write True or False. **06**

1) Solvents present within a crystal lattice of the drug is other than water, is known as solvates.
2) To provide delayed repeat action of drugs enteric coated tablets are used.
3) Emulsion is a biphasic type of dosage form.
4) Zero order release kinetics is attained in sustain release system.
5) Clonidine patches have been used for moderate hypertension.
6) Transdermal drug delivery system can be programmed to deliver a drug for delayed action.

Q.2 Answer the following. **16**

a) Describe the steps involved in sugar coating.
b) What is emulsion? Give its stability considerations.
c) What are the essential requirements for Parenteral products.
d) Write a note on rationale of sustained release formulations.

Q.3 Answer the following. **16**

a) Explain different types of Ophthalmic preparations. Write formulation of eye ointment.
b) Describe recently design transdermal drug release system.

Q.4 Answer the following. **16**

a) Write a detail note on physico-chemical properties of drug substances in pre -formulation study.
b) Write a detailed note on types of tablets.

Q.5 Answer the following. **16**

a) Describe Parenteral routes of drug administrations.
b) Describe quality control methods and measurements of tablet properties.

Q.6 Answer the following. **16**

a) Write in detail formulation considerations of suspension.
b) Write a note on design of mucosal drug delivery system.

Q.7 Answer the following. **16**

a) Explain the process of wet granulation in detail.
b) Explain oral drug delivery system.

SLR-EF-77

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
PHARMACEUTICAL CHEMISTRY
Pharmaceutical Technology (MSC012408)

Day & Date: Thursday, 21-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) How many batches we need for validation?
   a) 1 b) 3
   c) 2 d) 4

2) Direct oxidation of Ethanol produces _____.
   a) Alcohol b) Aldehyde
   c) Carboxylic Acid d) Acetic acid

3) _____ is the documented evidence which provides high degree of assurance that specific process produce product meeting its predetermined specification and quality characteristics.
   a) validation b) qualification
   c) revalidation d) process validation

4) Chlorination is effect by passing gaseous chlorin through ethyl acetate in a _____.
   a) Gas - lined water b) Ceramic tower
   c) Both a & b d) None of these

5) Shape of mixing element present in Zig -Zag mixer.
   a) V-shaped b) Cube
   c) Double cone d) Sigma

6) The first element of validation of new facilities systems or equipment is _____.
   a) installation qualification b) design qualification
   c) concurrent validation d) process validation

7) Coating used to protect the tablet from acidic environment of stomach is____.
   a) film coating b) sugar coating
   c) enteric coated d) encapsulation

8) In ETP plant operation, before the treatment of sludge thickener, inlet water consists of _____.
   a) 40% water + 60% solid b) 60% water + 40% solid
   c) 70% water + 30% solid d) 30% water + 70% solid

9) Slugging is related to _____.
   a) Dry granulation b) Wet granulation
   c) Mixing d) filling of the dies

10) GMP guidelines provide the guidelines for maintaining _____.
   a) a clean & hygienic manufacturing area
   b) clarity & control in manufacturing processes
   c) records of manufacture
   d) All of these

B) Fill in the blanks. **06**

1) FDA stands for _____.
2) The term scales up means _____.
3) API stands for _____.
4) A common saying in GMP that "if it is not documented, it never _____.
5) IP stands for _____.
6) Influent means _____.

Q.2 Answer the following. **16**

a) Give the difference between calibration and validation.
b) Draw a unit process diagram for Vinyl chloride.
c) Explain sugar coating process.
d) What is validation? Give its principle, importance and need of validation.

Q.3 Answer the following. **16**

a) Explain in detail Monochlorobenzene process.
b) Write a note on granulation method.

Q.4 Answer the following. **16**

a) Write a detail note on Qualifications.
b) What are the types of process validation? Explain in detail.

Q.5 Answer the following. **16**

a) Explain liquid phase oxidation of acetaldehyde to acetic acid by using oxygen.
b) Explain working of tablet compression machine with neat labelled diagram.

Q.6 Answer the following. **16**

a) Discuss the typical industrial nitration process for the preparation of Nitrobenzene
b) Give a brief note on master plan of validation.

Q.7 Answer the following. **16**

a) Discuss in detail types of mixers.
b) Describe Effluent Treatment Plant (ETP) process.

SLR-EF-79

Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
MEDICINL CHEMISTRY
Advanced Organic Chemistry – I (MSC08301)

Day & Date: Friday, 05-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

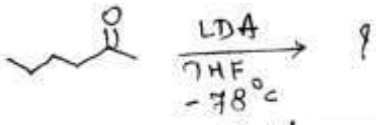
1) _____ can be used to prepare alkene by way of the α-metallo derivatives in Julia Olefination reaction.
   a) Diols b) Alkyl halides
   c) Sulfones d) All three

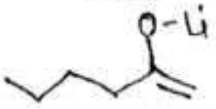
2) In Brook rearrangement migration of silyl group is _____.
   a) intramolecular b) from carbon to oxygen
   c) 1,2 - anionic d) All three

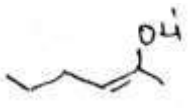
3) The first step of Eschenmoser fragmentation reaction is condensation between _____ and _____.
   a) ketone, aryl sulfonyl hydrazine
   b) aldehyde, aryl sulfonyl hydrazine
   c) α, β- epoxy ketone, aryl- sulfonyl hydrazine
   d) ketone, hydrazine

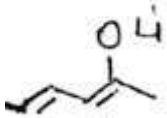
4) In the Wolff rearrangement _____ is formed as an intermediate.
   a) ketene b) nitrene
   c) isocyanate d) carbene

5) Enolates are _____ and ketones are _____, therefore there is a potential problem of self condensation.
   a) neutral, acidic b) acidic, neutral
   c) electrophiles, nucleophiles d) nucleophiles, electrophiles

6) 

   a) 

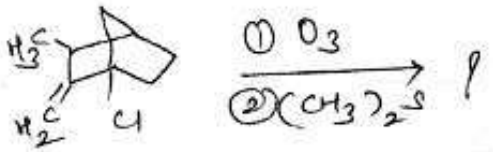
   b) 

   c) 

   d) All three

7) SeO_2 oxidizes _____ group to _____ group.
   a) methyl, aldehyde b) methylene, ketone
   c) methyl, ketone d) both a & b

8)



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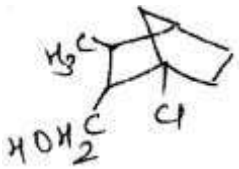

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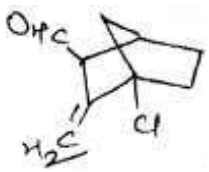

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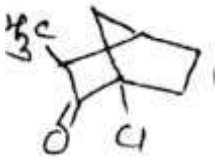

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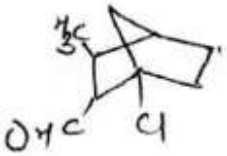
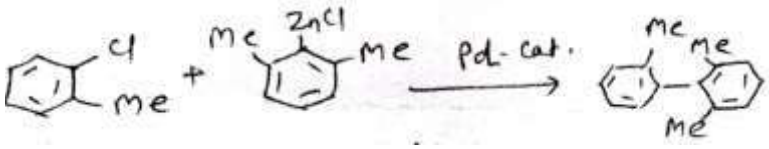


9) Periodic acid is useful in the structure determination of _____.

a) 1,2- glycols
b) carbohydrates
c) alkanes
d) both a & b

10)

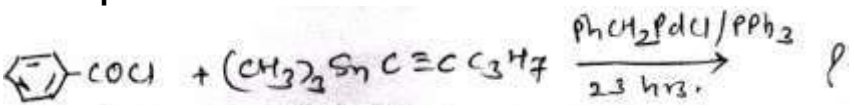


The above reaction is an example of _____ reaction.

a) Kumada
b) Suzuki
c) Negishi
d) Hiyama

B) Predict the product/s **06**

1)



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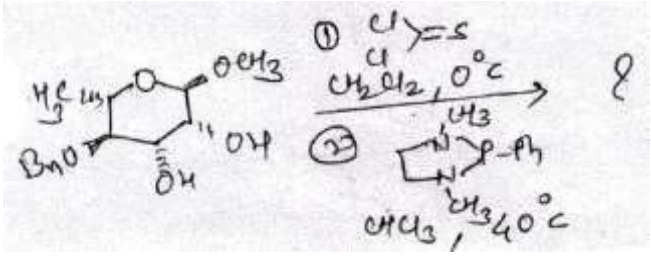

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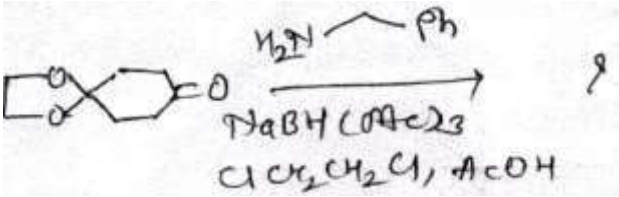

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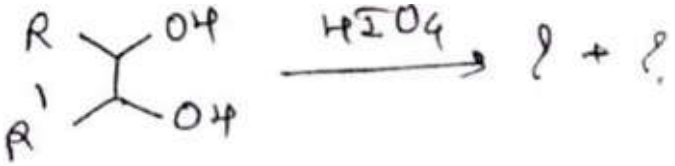

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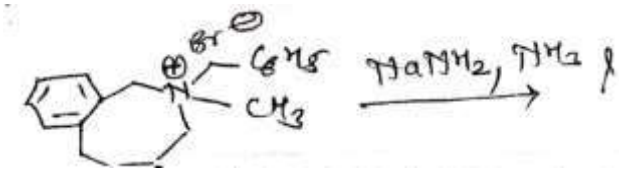
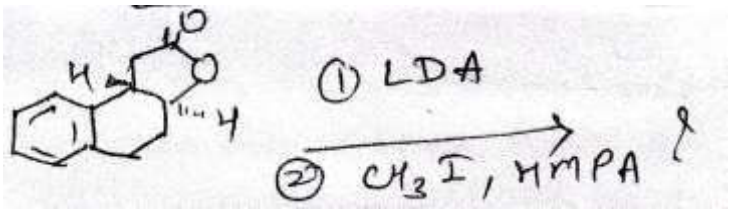


6) 

Q.2 Answer the following. **16**

a) Explain the mechanism of Julia olefination with suitable example.
b) Explain reaction mechanism of Wolff rearrangement with suitable example.
c) Give the synthetize application of selenium dioxide.
d) Explain with suitable example alkylation of highly stabilized enolates.

Q.3 Answer the following

a) Discuss different applications of lithium dialkyl cuprate. **08**
b) Explain reaction mechanism and stereochemistry of Iodolactonization reaction and give its applications. **08**

Q.4 Answer the following

a) Explain alkylation of enolates stabilizes by two functional group and synthesis by decarboxylation of malonates & β- di carbonyl compound. **08**
b) Explain with suitable examples generation of specific enolates by different method other than deprotonation method. **08**

Q.5 Answer the following

a) Explain application and reaction mechanism of DCC as a reagent. **08**
b) Give reaction mechanism and applications of Heck reaction. **08**

Q.6 Answer the following

a) Discuss reaction mechanism and application of Payne rearrangement reaction. **08**
b) Discuss reaction mechanism and applications of Strecker amino acid synthesis. **08**

Q.7 Answer the following

a) Discuss application and reaction mechanism of iodoisobenzyl diacetate. **08**
b) Disuses intramolecular alkylation of enolates and alkylation of enamines. **08**

SLR-EF-80

Seat No.	

Set P

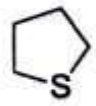
M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
MEDICINL CHEMISTRY
Chemistry of Bioactive Heterocycles (MSC08302)

Day & Date: Sunday, 07-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Question Nos.1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

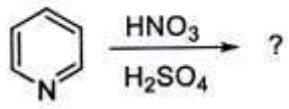
Q.1 A) Choose correct alternative (MCQ). **10**

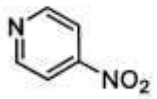
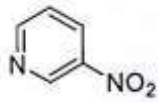
1) The IUPAC nomenclature for the given heterocycle is _____.

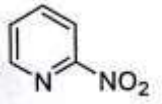
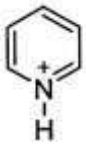


a) Thiaolane b) Thiolane
c) Thiaetane d) Thietane

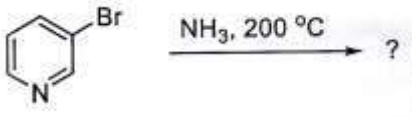
2) The major product formed in the following reaction is:

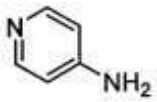
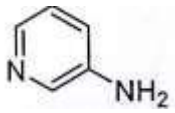


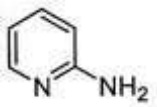
a)  b) 

c)  d) 

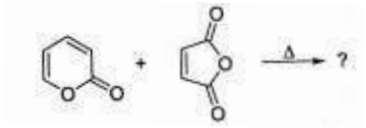
3) The major product formed in the following reaction is _____.

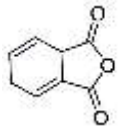


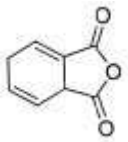
a)  b) 

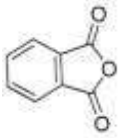
c)  d) No reaction

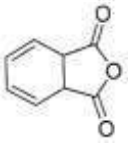
4) The major product formed in the following reaction is:



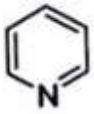
a) 

b) 

c) 

d) 

5) Which compound is least basic?

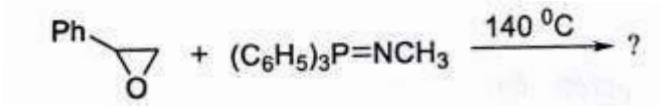
a) 

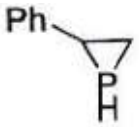
b) 

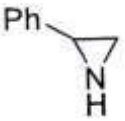
c) 

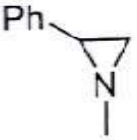
d) 

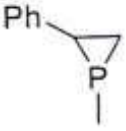
6) Predict the product of following reaction



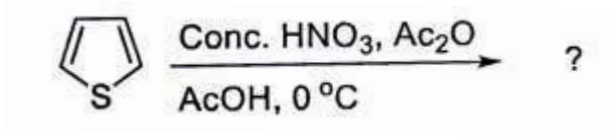
a) 

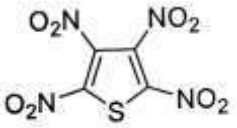
b) 

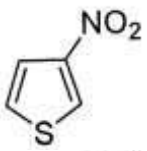
c) 

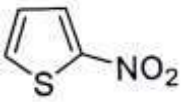
d) 

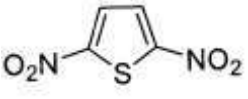
7) The major product formed in the following reaction is:



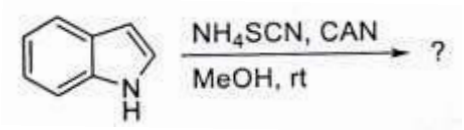
a) 

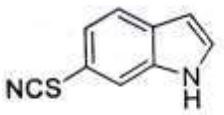
b) 

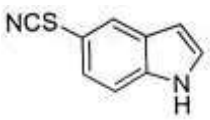
c) 

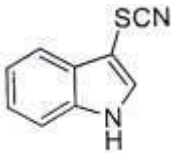
d) 

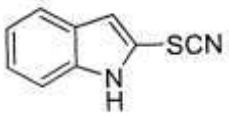
8) Which is the most probable main product of the following reaction?



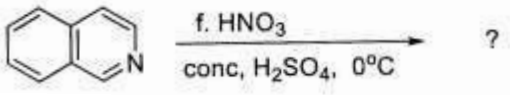
a) 

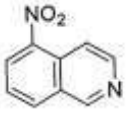
b) 

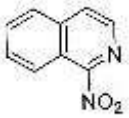
c) 

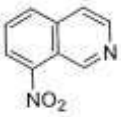
d) 

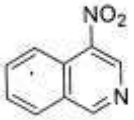
9) Which is the major product of the following reaction?



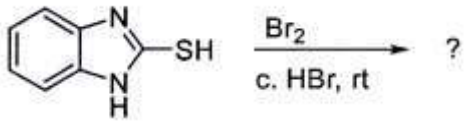
a) 

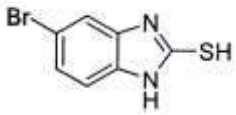
b) 

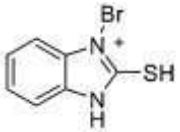
c) 

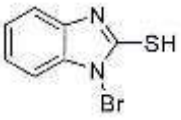
d) 

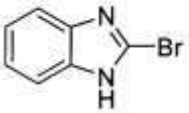
10) Which is the most probable main product of the following reaction?



a) 

b) 

c) 

d) 

B) True or False. **06**

1) Furan is more reactive towards electrophile than pyrrole.
2) Pyridine is less basic than imidazole.
3) Indole is less reactive towards electrophile than pyridine.
4) Thiophene is more resonance stabilized than furan.
5) Aza is the prefix used for oxygen containing heterocycles.
6) IUPAC system is also known as Trivial system.

Q.2 Answer the following. **16**

a) Write a short note on synthesis of Tetrazine.
b) Discuss the two methods for synthesis of aziridines.
c) How to prepare pyridones from 1,3-dicarbonyl compounds? Discuss in details with mechanism.
d) What are the methods for synthesis of coumarins? Discuss with mechanism.

Q.3 Answer the following.

a) Discuss with mechanism the Paul-Knorr synthesis of furan and pyrrole. **08**

b) What are the various methods for synthesis of benzimidazoles and benzothiazoles? **08**

Q.4 Answer the following.

a) What is the reactivity of pyridine towards electrophilic substitution reaction with regioselectivity? **08**

b) What are Skraup synthesis and Doebner-Miller synthesis reactions? Discuss with examples and mechanism. **08**

Q.5 Answer the following.

a) What are Baldwin Rules? Discuss in Details. **08**

b) Write two methods of each for synthesis of thiazole and isothiazole. **08**

Q.6 Answer the following.

a) At which positions do indole and benzothiophene reacts most readily with electrophiles? Give reason of each. **08**

b) What are the methods for synthesis of pyrimidine? Explain with examples. **08**

Q.7 Answer the following.

a) What are the methods for synthesis of imidazole and pyrazole? **08**

b) What is regioselectivity of bromination and nitration reactions in pyrrole with examples. **08**

SLR-EF-82

Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
MEDICINL CHEMISTRY
Drug Development (MSC08307)

Day & Date: Tuesday, 09-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any Three from Q. No. 3. to Q. No. 7.
3) Figure to right indicate full marks.

Q.1 A) Choose the correct alternatives from the given options. **10**

1) Chemical structures are usually created, processed and utilized as ___.
   a) Figure b) molecular graphs
   c) Nodes d) none of these

2) The process of movement of unchanged drug from the site of administration to systemic circulation is called _____.
   a) drug distribution b) drug absorption
   c) drug excretion d) drug metabolism

3) _____ of the following terms is the measure of how strongly a drug binds to a receptor.
   a) Affinity b) Efficacy
   c) Potency d) Stability

4) IC_{50} is _____.
   a) biased towards inhibition
   b) biased towards viability
   c) balance between inhibition and viability
   d) none of these

5) _____ is meant by the therapeutic index or ratio.
   a) The ratio of LD_{50} to ED_{99} b) The ratio of LD_{50} to ED_{50}
   c) The ratio of ED_{99} to ED_{50} d) The ratio of $ED_{5}o$ to LD_{50}

6) Lipinski proposed a set of _____ rules that would predict whether a molecule was likely to be orally bioavailable
   a) 3 b) 4
   c) 5 d) 10

7) _____ is an example of effectors in signal transduction.
   a) Epinephrine b) G-protein coupled receptor
   c) Adenylyl cyclase d) none of these

8) The antimalarial quinine from cinchona bark, the cardiac stimulus from foxgloves are the examples of sources of drugs _____.
   a) Marine sources b) Microorganisms
   c) Animal sources d) Ethnopharmeceutical sources

9) Factors affecting drug distribution are ____.
   a) Age b) Pregnancy
   c) Obesity d) all of the above

10) _____ is the ratio of sum of rate of glomerular filtration and active secretion minus rate of reabsorption to plasma drug concentration C.
   a) Elimination half-life b) Apparent volume of distribution
   c) Renal clearance d) none of these

B) Fill in the blanks. **06**

1) Taft formulated a mode for extracting ____ and _____ and leading to the first steric parameters.
2) The basic functional unit of kidney involved in excretion is the ____.
3) _____ type of hydrogen bonding present when hydrogen bonding occurs between molecules.
4) The function of phosphatidylcholine is to facilitate electron transfer from _____ to cytochrome P-450.
5) The hypothetical volume of body fluid into which a drug is dissolved or distributed, it is called _____.
6) Most weakly basic drugs (pKa > 8) are absorbed from _____.

Q.2 Answer the following. **16**

a) What is pKa value, discuss on pKa value and ionization of drug?
b) Write a note on Concept of lead compounds and lead modification.
c) Describe volume of Distribution of drug.
d) Discuss on introduction of IC_{50} and MIC.

Q.3 Answer the following.

a) Describe in details the lipophilicity of drug and explain the partition coefficient versus biological activity of drug. **08**
b) What is mean by Structure-based drug design, Explain in detail Homology Modeling? **08**

Q.4 Answer the following.

a) What is excretion of drugs, enlist the different organ systems involved in it, Write brief on renal excretion of drugs? **08**
b) What is receptor and types of receptor and Explain drug receptor interaction with factor affecting in drug receptor interaction? **08**

Q.5 Answer the following.

a) What is biotransformation of drugs? Explain in detail factors affecting biotransformation of drugs. **08**
b) Discuss in details the combined effect of drugs. **08**

Q.6 Answer the following.

a) Write in detail historical progress and development of QSAR and statistical tools applied for QSAR model development and validation. **08**
b) Discuss in details the solubility of drugs, application and factors affecting solubility of drug and comment on relation between solubility and absorption of drug. **08**

Q.7 Answer the following.

a) What do you mean by Pharmacokinetic model, write down applications and explain in short compartment models? **08**
b) Explain in details the bioavailability of drug and discuss on Lipinski rule of five. **08**

SLR-EF-83

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
MEDICINL CHEMISTRY
Pharmaceutical Dosage Forms (MSC08401)

Day & Date: Monday, 18-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. (MCQ) **10**

1) Nitroglycerin is _____ tablet.
   a) chewable b) effervescent
   c) enteric coated d) buccal

2) _____ are the systemic routes of drug administration.
   a) Oral b) Rectal
   c) Sublingual d) All of the above

3) The formulation that best meets the goals for the product is selected to be it's _____ formula.
   a) matter b) master
   c) material d) none of these

4) Suspensions are classified into _____ main classes according to its pharmaceutical use.
   a) oral suspensions b) parenteral suspensions
   c) ophthalmic suspensions d) all of the above

5) With organic compounds, an increase in the number of _____ groups seem to increase the sweetness of the compound.
   a) carbonyl b) methyl
   c) hydroxyl d) ethyl

6) _____ methods are commonly used for evaluating the physical stability of suspension.
   a) Sedimentation method b) Micromeritic method
   c) Electrokinetic method d) All of the above

7) Noyes Whitney equation gives the relation between _____ and the aqueous solubility.
   a) dissolution rate b) reaction
   c) compound d) molecule

8) _____ are the main types of delivery system for respiratory dosage forms.
   a) Metered-dose inhalers b) Dry-powder inhalers
   c) Nebulisers d) All of the above

9) Rate-limiting steps in the bioavailability of dosage form is/are _____.
   a) release from the dosage form
   b) dissolution of the drug
   c) absorption through the gastrointestinal mucosa
   d) all of the above

10) _____ are the common transdermal patch designs.
a) Drug-in-adhesive b) Drug-in-matrix
c) Rate-limiting membrane d) All of these

B) Fill in the blanks **06**

1) Dusting powders should be passed through a _____ sieve to enhance their _____.
2) The isotonicity of sterile solution may be adjusted by adding _____.
3) LAL stands for _____.
4) Before the formulation of a drug substance into a dosage form, it is essential that it be _____ and _____ characterized.
5) Noyes Whitney equation is _____.
6) Matrix systems are also called as because _____ the drug is homogeneously dispersed throughout a rate-controlling medium.

Q.2 Answer the following. **16**

a) Write the importance of dosage forms.
b) What do you mean by parenteral products? Describe the different routes of administration of parenteral products.
c) Define and give example of following ingredients.
1) Buffering agent
2) Chelating agent
3) Humectant
4) Surfactant
d) Write the classification of control release system and list the advantages and disadvantages of such a system.

Q.3 Answer the following.

a) What are Monophasic liquid dosage form? Write in detail about syrups, Elixirs and Linctuses. **08**
b) Define the term Suspension. Discuss about the formulation of suspension. **08**

Q.4 Answer the following.

a) Explain different steps involved in sugarcoating of tablets. **06**
b) What are the various ingredients used in the preparation of semisolid dosage form with suitable examples? **10**

Q.5 Answer the following.

a) Write down the factors affecting on designing of dosage forms and comment on Accelerated Stability Studies. **08**
b) How will you increase drug solubility and absorption in topical ophthalmic preparation, also mention sterility of ophthalmic preparations? **08**

Q.6 Answer the following.

a) Explain in brief about excipients used in parenteral drug delivery system. **08**
b) 1) Define excipients and explain selection and mode of action of preservatives. **08**
2) Define chelating agent and explain the mechanism of drug degradation.

Q.7 Answer the following.

a) What are Ointments? Classify different ointment bases used in the preparation of ointments. Describe briefly each base. **10**
b) Explain Wet granulation method of tablet manufacturing. **06**

SLR-EF-84

Seat No.	

Set P

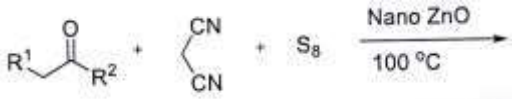
M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
MEDICINL CHEMISTRY
Modern Organic Chemistry (MSC08402)

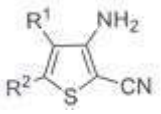
Day & Date: Tuesday, 19-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

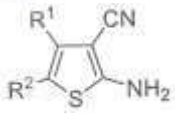
Instructions: 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

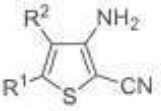
Q.1 A) Choose the correct alternative. **10**

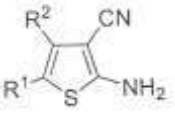
1) Predict the product of the following reaction



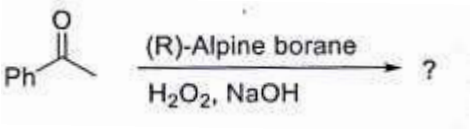
a) 

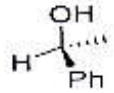
b) 

c) 

d) 

2) Predict the correct option of a major product.



a) 

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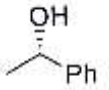
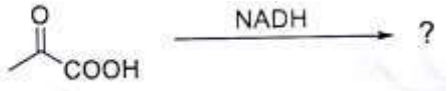
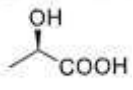
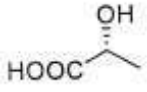
c) 

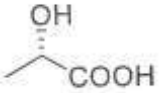
d) Both (a) and (c)

3) Predict the correct option of major product.



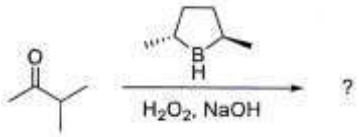
a) 

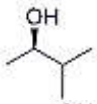
b) 

c) 

d) Both (a) and (b)

4) Predict the correct option of major product.



a) 

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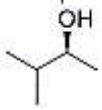
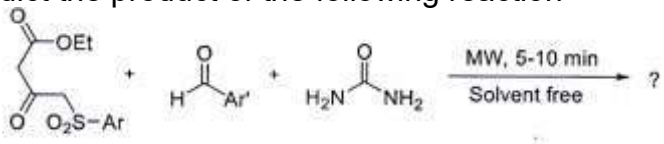
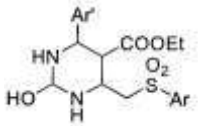
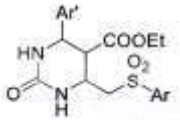
c) 

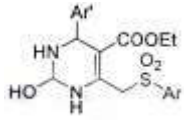
d) Both (b) and (c)

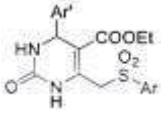
5) Predict the product of the following reaction



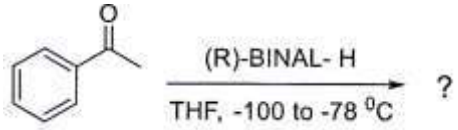
a) 

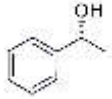
b) 

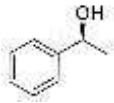
c) 

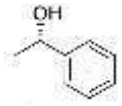
d) 

6) In the following transformation, the correct option is _____



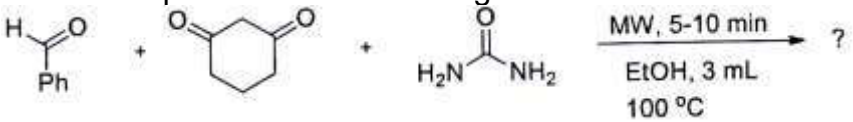
a) 

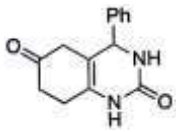
b) 

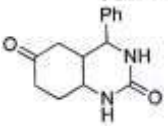
c) 

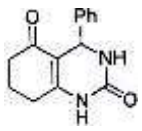
d) Both (a) and (c)

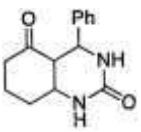
7) Predict the product of the following reaction



a) 

b) 

c) 

d) 

8) The MOFs which are hard to synthesize by traditional routes, are synthesized by _____ method.

a) Ultrasound
b) Solvo-thermal
c) Crystal transformation
d) Microwave

9) In MOF-5, metal node is _____.
   a) Fe b) Ti
   c) Zn d) Cu

10) According to computational fitting results surface area of MOFs could probably reach up to _____.
   a) 15600 m^2/g b) 14800 m^2/g
   c) 7140 m^2/g d) 7040 m^2/g

B) Fill in the blanks. **06**

1) The chiral reagent approach for asymmetric synthesis always gives product with 100% ee.
2) The poly-substituted 2-amino-thiophene is the product of Gewald reaction.
3) The epoxidation reaction is not stereospecific reaction.
4) Those reactions including three and more starting materials are classified as one pot reactions.
5) An increase in the number of benzene rings in organic linker could not affect the pore size of metal organic frameworks.
6) The pore size of mesoporous materials ranges more than 50 Å.

Q.2 Answer the following. **16**

a) Define stereospecific reaction? Why addition of bromine and electrophilic epoxidation with alkene are diastereospecific?

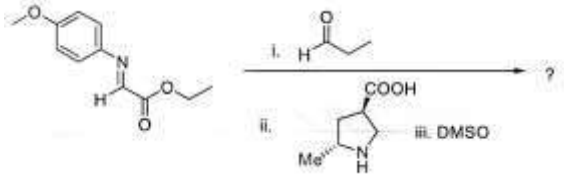
b) Write the product of the following Strecker MCR with mechanism.

c) Write a note on analysis methods of MOF.

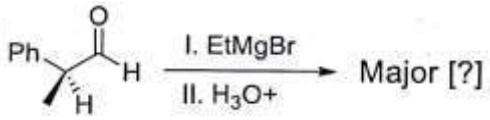
d) Write a short note on Enantiomeric excess?

Q.3 Answer the following.

a) Predict the major product and give justification for diastereoselectivity with mechanism in following transformation? **08**

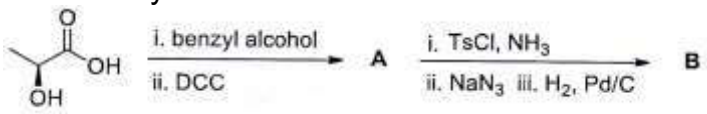


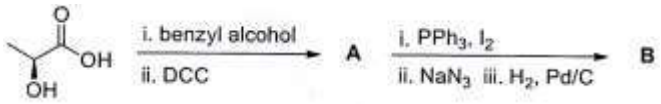
b) What is Felkin Ahn Model? Discuss in details and give justification for the major product of following reaction. **08**



Q.4 Answer the following.

a) Define chiral Pool? Explain the following transformation with stereochemistry. **08**

i) 

ii) 

b) How MCRs are useful for synthesis of heterocycles using Knoevenagel reaction? **08**

Q.5 Answer the following.

a) What are the functionalized MOFs? Explain in detail the methods involved in MOF Functionalization. **08**

b) What are the synthetic routes to metal organic frameworks? Explain solvo-thermal and solid-state methods of MOF synthesis with suitable diagram. **08**

Q.6 Answer the following.

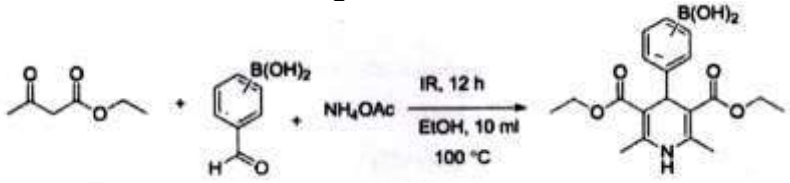
a) How SAMP/RAMP chiral auxiliary useful in the asymmetric synthesis? Discuss their applications in enantioselective synthesis. **08**

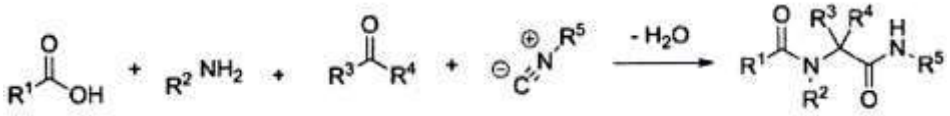
b) Define chiral catalyst? What is Sharpless epoxidation? Comment on the stereoselectivity with examples. **08**

Q.7 Answer the following.

a) Write mechanism of Ugi and Gewald reaction? Write different applications of each. **08**

b) Write the mechanism of following reactions. **08**

i) 

ii) 

SLR-EF-85

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
MEDICINL CHEMISTRY
Drug Regulatory Affairs (MSC08403)

Day & Date: Wednesday, 20-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) A competitor can file for _____ before its expiry under Para IV certification clause.
   a) ANDA b) eCTD
   c) RLD d) CTD

2) Who is the member of ICH from Japan?
   a) Japan Federation of pharmaceutical Industries and Associations (JFPIA)
   b) Japan Pharmaceutical Manufacturers Association (JPMA)
   c) Japan FDA (JFDA)
   d) None of these

3) As per ICH guidelines residual solvent carbon tetrachloride is classified as _____.
   a) Class I solvent b) Class II solvent
   c) Class III solvent d) Class IV solvent

4) Complete specification must be submitted with in _____ months of filling the provisional specification.
   a) 10 b) 11
   c) 18 d) 12

5) Schedule _____ defines the clinical trials as the requirements and guidelines for import and manufacture of new drugs for sale or for clinical trials.
   a) K b) P
   c) M d) Y

6) Intellectual property rights (IPR) protect the use of information and idea that are of _____.
   a) Social value b) Moral value
   c) Commercial value d) Ethical value

7) CFR stands for _____.
   a) Centre of Federal Registration
   b) Code of Federal Regulations
   c) Centre of Federal Regulations
   d) Code of Federal Register

8) Type-I DMF deals with _____.
   a) Packaging materials b) Manufacturing site
   c) Drug substance d) Excipients

9) _____ with GMP is a necessary condition for the marketing authorization to sell the product.
   a) non compliance b) confirmation
   c) practice d) compliance

10) _____ is a right obtained by a person for his innovation.
   a) CTD b) Patent
   c) DMF d) GMP

B) Fill in the blanks. **06**

1) A company wishes to ensure that no more else can use their logo is _____.
2) List of approved drugs and their associated IPR is available in ____ book.
3) The formal ICH procedure is a step wise procedure consisting of _____ steps.
4) MedDRA stands for _____.
5) Common Technical Document (CTD) is divided into _____ modules.
6) _____ is the India's national drug regulatory body.

Q.2 Answer the following. **16**

a) Write definitions of following
   1) Controlled area
   2) Airlock
   3) Containment
   4) Critical Parameter

b) What is copyright explain in brief?

c) Write the difference between Quality assurance Vs. Quality controls with respect to responsibility.

d) Write a note on Orange book.

Q.3 Answer the following.

a) Write a short note on Laboratory control management system, Packaging and labeling management system and material management system as per GMP. **08**

b) Explain in details typical HVAC system and its components as per GMP. **08**

Q.4 Answer the following.

a) Discuss in brief about Drug master file (DMF) and describe the types of DMF. **08**

b) What is patent and types of patent? Write an overview on Exclusive Market Right (EMR) with an examples. **08**

Q.5 Answer the following.

a) Write an overview on drug regulatory agencies in Australia (TGA) and Europe. **08**

b) Explain in detail Batch manufacturing records (BMR) and their importance. **08**

Q.6 Answer the following.

a) Explain in details about Drug regulatory agency in India (CDSCO) with organogram and Drug regulatory body FDA. **08**

b) Discuss in details about requirement and guidelines of Schedule- M as per Drug and cosmetics act. **08**

Q.7 Answer the following.

a) Write an overview on Trade secrete and Geographical Indications. **08**

b) Discuss in details the role of quality assurance department (QA) in pharmaceutical industries. **08**

SLR-EF-86

Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
MEDICINL CHEMISTR
Medicinal Chemistry (MSC08408)

Day & Date: Thursday, 21-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) The major route of elimination of the volatile general anaesthetics is via _____.
   a) Kidneys b) Skin
   c) Lungs d) Liver

2) Monoamine reuptake inhibitor is mechanism of action of which of the following drugs.
   a) Phenelzine b) Tranylcypromine
   c) Fluoxetine d) Paroxetine

3) _____ is the brand name of acyclovir drug.
   a) Zopirax b) Mopirax
   c) Lopirax d) Zovirax

4) Which one of the following does not contain the piperidine moiety in the structure _____.
   a) Mepivacaine b) Cyclomethycaine
   c) Lidocaine d) Bupivacaine

5) Which one of the following belongs to imidazolidine-2,4-dione class.
   a) Phenytoin b) Trimethadione
   c) Phensuximide d) Paramethadione

6) Captopril is used as an _____drug.
   a) Antidepressant b) Antineoplastic
   c) Antihistamine d) Antihypertensive

7) Ibuprofen drug is fairly comparable to _____.
   a) Aspirin b) Cetrizine
   c) Phenelzine d) Cefixime

8) Class of carbamazepine is _____.
   a) Benzodiazepine b) Succinimides
   c) Barbiturates d) Iminostillbenes

9) Chloroquine is _____.
   a) Luminal amoebicide b) Systemic amoebicide
   c) Mixed amoebicide d) Oral amoebicide

10) Indomethacin is _____.
   a) Less acidic b) Optically active
   c) Selective to COX-II d) Producer of gastric ulcer

B) True or False **06**

1) The cephalosporins are beta-lactam antibiotics.
2) Halothane and Thiopental are antidepressant drugs.
3) Antineoplastics easily develop resistance.
4) Therapeutic remdesivir treatment has a clear clinical benefit in SARS-Cov-2 infected rhesus monkeys.
5) Glipizide is used to treat fungal medication.
6) Chloramphenicol is obtained from streptomyces capreolus.

Q.2 Answer the following **16**

a) Explain the mechanism of action of Cephalosporins.
b) Explain classification of Antifungal drugs.
c) Explain the synthesis of Propranolol.
d) Explain the antibiotic activity of Penicillins.

Q.3 Answer the following

a) Explain the SAR and mechanism of action of Tetracycline. **08**
b) Explain the SAR and synthesis of Paracetamol. **08**

Q.4 Answer the following

a) Explain the synthesis and mechanism of action of Chloroquine. **08**
b) Explain synthesis and mechanism of action of Ampicillin. **08**

Q.5 Answer the following

a) Explain classification and mechanism of action of Antibiotics. **08**
b) Explain the synthesis and mechanism of action of Phenytoin. **08**

Q.6 Answer the following

a) Explain the SAR and mechanism of action of Phenobarbital. **08**
b) Explain the SAR and synthesis of Phenelzine. **08**

Q.7 Answer the following

a) Explain antidiabetic activity of Insulin & Glipizide. **08**
b) Explain SAR and synthesis of Diphenlhydramine. **08**