UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Examination – 2022

Roll No. .....

Subject: Chemistry **Paper: I-A / I-1-N Physical Chemistry (Special)** **Time: 3 Hrs.** **Marks: 100**

NOTE: Attempt any FOUR questions. All questions carry equal marks.

Q.1. (a) Discuss nuclear fission and nuclear fusion process in detail. 12

(b) What is nuclear decay? Discuss the kinetics of nuclear decay. 13

Q.2. (a) What is adsorption isotherm? Discuss Freundlich adsorption isotherm for adsorption of a gas on solid and adsorption from solution to solid surface. 10

(b) What is heterogeneous catalysis? Discuss the kinetics of catalytic reaction of a gas on solid surface when gas is weakly adsorbed. 15

Q.3. Define the term "SOL". Give different methods of preparation of SOL. Also discuss electrical properties of SOL. 25

Q.4. What is osmosis and osmotic pressure? How would you determine the molecular weight of macromolecules by Osmomtery? 25

Q.5. (a) What are GELS? Give their classification. Discuss the properties of GELS. 13

(b)What are EMULSIONS? How can you classify the emulsions? Discuss the orientation wedge theory of emulsion type. 12

Q.6. What are tracers? Discuss various applications of tracers? 25

Q.7. Write short notes on any TWO of the following: 25

(i) Michaelis-Menten kinetics

(ii) Purification of SOL

(iii) Radioactive equilibrium

UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Examination – 2022

Roll No. .....

Subject: Chemistry Paper: I-B / II-1-N Inorganic Chemistry (Special) **Time: 3 Hrs. Marks: 100**

NOTE: Attempt any FOUR questions. All questions carry equal marks.

Q. No.1	**a)**Explain the structure of triatomic molecules by Walsh diagram.	**12**
	b)How organic reagents are classified? Explain with chart and suitable examples.	**13**
Q. No.2	**a)** Explain the role of d- orbital in pi-bonding in inorganic anionic species.	**10**
	b) What is Borazine? Write its chemical properties and uses.	**15**
Q. No.3	**a)** Discuss the chemistry of Rubeanic acid and Cupferron.	**08**
	b) Write about Periodic anomalies of non metals and post transition metals in detail with examples.	**10**
	c) What are the applications of ICP spectroscopic analysis in pharmacy andindustry?	**07**
Q. No.4	**a)** What are the types of stability? Explain Kinetic stability with its mathematical interpretation?	**12**
	b) What is the difference between premix burner and total consumption burner? Write about different fuel-oxidant combinations and their resulting temperatures.	**13**
Q. No.5	**a)**How organic reagents used in chromatographic analysis?	**10**
	b) What is the principle of Atomic Absorption Spectrophotometer? Discuss the instrumentation of AAS.	**15**
Q. No.6	**a)** How the stability of a compound can be predicted by thermodynamical cycle? Explain with reference to NF_3 and NCl_3.	**10**
	b) Explain the working and principle of ICP torch in plasma spectroscopy.	**15**
Q. No.7	Write note on any **TWO** of the followings:	
	i. Explain the Homocyclic system of sulphur, giving suitable examples.	**2x12.5 =25**
	ii. Phosphazine	
	iii. Defects and limitations of VBT	

UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Examination – 2022

Roll No. ……

Subject: Chemistry **Paper: I-C / III-1-N (Organic Chemistry) (Special)** **Time: 3 Hrs.** **Marks: 100**

NOTE: Attempt any FIVE questions. All questions carry equal marks.

Q.1 (a) In pyridinium oxide, the most favorable position towards attack of an electrophile as well as nucleophile is γ-carbon. How would you justify this statement? **(5)**

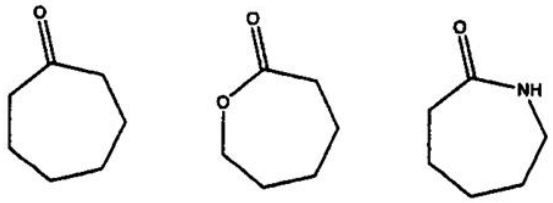
b) Describe two methods for the conversion of cyclohexane carboxylic acid into cyclohexane amine. **(5)**

c) Explain chichibabin reaction along with its mechanism? **(5)**

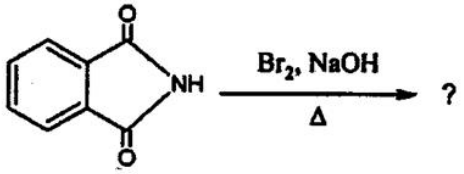
d) Arrange the following in order of reactivity towards aromatic electrophilic substitution reactions? Explain your answer in detail? **(5)**

i. Benzene ii. Pyrrole iii. Furan iv. Thiophene

Q2. a) Outline the synthesis of following compounds starting from cyclohexanone. Write complete mechanism for all reactions. **(15)**

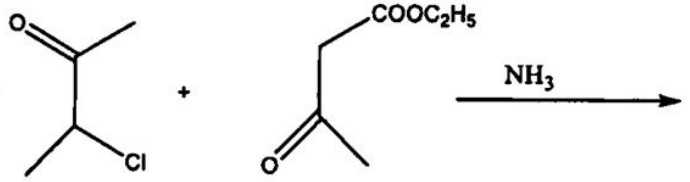


b) Complete following reaction along with its mechanism. **(5)**

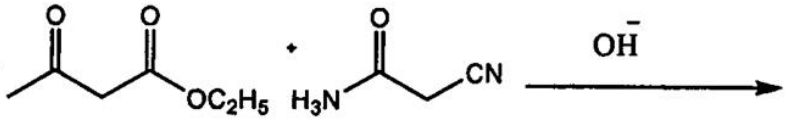


Q3. (a) Complete the following reactions. Describe the mechanism of each. **(5x2)**

i.

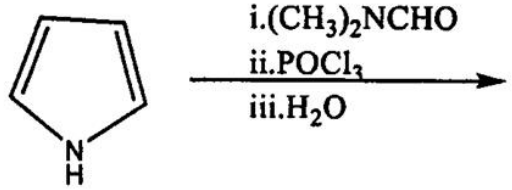


ii.

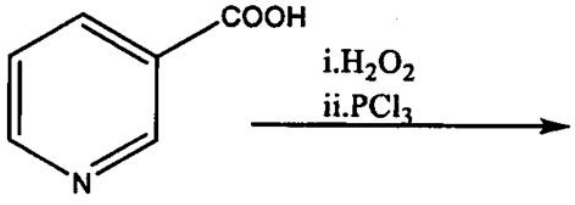


(b) Complete the following reactions along with their mechanisms. **(5x2)**

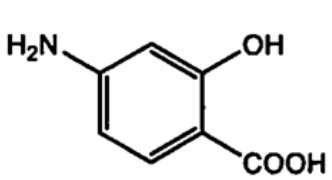
i.



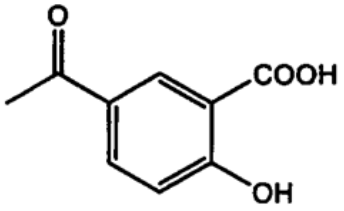
ii.



Q4. a) Give the retrosynthetic analysis of the following compounds followed by their synthesis through economically favorable routes. **(2 x 6)**



i



ii

b) Discuss the differences, similarities and limitations of Friedel craft's alkylation and acylation reactions. Decorate your answer with suitable examples. **(8)**

Q5. a) What mono nitro product would you expect from the following substrates when treated with HNO_3-H_2SO_4 mixture, separately. Justify your answer. **(4x3)**
i. Methyl cinnamate ii. N-Benzylaniline iii. 4-isopropyltoulene iv. Benzonitrile

b) What is SN_{AR} mechanism? Narrate evidences in favor of this mechanism. **(8)**

Q6. a) What do you know about singlet and triplet nitrenes? Decorate your answer with the help of suitable examples. **(5)**

b) Write three different methods with mechanism to generate carbenes. **(5)**

c) Draw the structure of 1,2-didehydrobenzene. Outline three different methods for its formation. **(5)**

d) Discuss the role of nitrenes in heterocyclic synthesis. **(5)**

Q7. a) What are cycloaddition reactions? With the help of energy correlation diagrams as well as FMO approach, analyze the Diels-Alder reaction explaining its stereochemistry and regiochemistry. **(8)**

b) Explain the following terms **(3x4)**
(i) Sigmatropic rearrangement (ii) Group transfer reaction (iii) Electrocyclic reaction

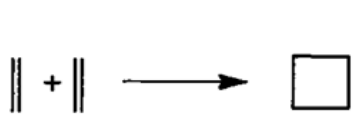
Q8. a) What are protecting groups? Describe the addition and removal of three different protecting groups for amines. **(9)**

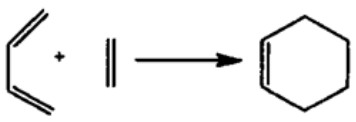
b) Suggest retrosynthetic analysis and synthesis for each of the following target molecules. **(6)**
i. 1-Hydroxycyclohexane-1-carbonitrile
ii. 2-(chloromethyl)-1-ethoxy-4-nitrobenzene

c) What is Aza Wittig Reacion? Draw its complete mechanism. **(5)**

Q9. a) What is Arndt-Eistert synthesis? Draw the mechanism of each step. **(5)**

b) Which of the following reactions will proceed thermally and which will undergo photochemically? Explain your answer by Frontier Molecular Orbital (FMO) approach. **(15)**





UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Examination – 2022

Roll No. .....

Subject: Chemistry Paper: I-D: / IV-1-N Bio-Chemistry (Special) Time: 3 Hrs. Marks: 100

NOTE: Attempt any FIVE questions. All questions carry equal marks.

1. (a) Describe the glycolysis in detail and give an account of energy yield in each step of this process. (12)

   (b) Describe briefly digestion and absorption of carbohydrates in human body (8)

2. Explain the structure, chemistry, synthesis and biological function of insulin hormone. (20)

3. (a) Explain briefly the β-oxidation of fatty acids in detail. (10)

   (b) Discuss the disorders linked to serum urate level. (10)

4. (a) Briefly describe the synthesis RNA and its splicing. (5+5)

   (b) Briefly explain the synthesis and degradation of amino acids. (10)

5. Explain de novo pathway for the synthesis of AMP and GMP from α-D-Ribose 5-Phosphate and how purine biosynthesis regulates? (15+5)

6. (a) Explain the oxidative phosphorylation and regulation of ATP production. (10)

   (b) Give and account of biosynthesis of Palmitic acid (10)

7. (a) Discuss briefly Gluconeogenesis and its regulation. (10)

   (b) Which kind of hormones secreted by posterior lob of Pituitary gland? Describe the chemistry and functions of oxytocin. (10)

8. (a) Explain transamination and deamination reactions of amino acids and its importance. (10)

   (b) Explain how proteins are digested and absorbed in human body (10)

9. Write notes on any two of the following (10+10)

   (a) Glycolysis

   (b) Male sex hormones

   (c) Synthesis and splicing of RNA

UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Examination – 2022

Roll No. .....

Subject: Chemistry **Paper: I-E / V-1-N Analytical Chemistry (Special)** **Time: 3 Hrs.** **Marks: 100**

NOTE: Attempt any FOUR questions. All questions carry equal marks.

Q1. a) Discuss some applications of GC in various fields of science. 05

b) Write a detailed note on Instrumentation and detectors used in GC. 15

Q2. a) Write down a note on each component used in HPLC along folw-sheet diagram. 20

b) Which detector you will use for drug analysis in HPLC. 05

Q3. a) Write a note on Indicator electrodes. Discuss its types. 10

b) Write a note on the Glass Electrode for the measurement of pH. 15

Q4. a) Write general principle and instrumentation of DTA. 10

b)What does enthalpy represent and what type of information it provides. How is it determined. 15

Q5. a) Write a detailed note on differential pulse Polarography. 10

b) Write a note on. i) residual current ii) diffusion current, and iii) Half Wave potential. 15

Q6. Discuss various types of amperometric titrations. 25

Q7. a) Write a note on application of conductometry. 10

b) Discuss the theory and working of a conductometer. 15

UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Examination – 2022

Roll No. .....

Subject: Chemistry **Paper: I-F / VI-1-N Applied Chemistry (Special)** **Time: 3 Hrs.** **Marks: 100**

NOTE: Attempt any FOUR questions. All questions carry equal marks.

Q. 01	a. Discuss the different raw materials used for paper manufacturing. Discuss the importance of these raw materials with reference to the specific end product b. Compare and contrast the sulphate and sulphite processes for preparation of pulp	**15** **10**
Q. 02	a. Discuss preparation and industrial importance of acetylene, ethylene and propylene b. What is unit process? Describe any two unit processes involved in petroleum processing	**15** **10**
Q. 03	a. Briefly explain the classification of fertilizers. b. Explain the manufacturing of urea with the help of a flow sheet diagram.	**10** **15**
Q. 04	a. Differentiate between chrome tanning and vegetable tanning processes in terms of the chemistry involved and properties of the finished leather. b. Discuss waste disposal and pollution aspects involved in tanning industries.	**15** **10**
Q. 05	a. Give the detailed classification of polymers. b. What is polymer processing? Discuss extrusion, injection, modeling and blow molding of plastics.	**10** **15**
Q. 06	a. Compare and discuss fixed oils, essential oils and drying oils taking into account structural differences and properties. Support your answer with suitable examples. b. Write a brief note on the preparation of alkyd resins and their industrial applications.	**15** **10**
Q. 07	Write a short note on the following:- a. Ionic polymerization b. Fractional distillation c. Hardening of oil d. Lubricants and paints e. Organic fertilizers	 **05** **05** **05** **05** **05**

UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Examination – 2022

Roll No. .....

Subject: Chemistry **Paper: II-A / I-2-N Physical Chemistry (Additional)** **Time: 3 Hrs.** **Marks: 100**

NOTE: Attempt any FOUR questions. All questions carry equal marks.

1. Write a comprehensive note on LASER, working principal, its type and applications (25)

2. (a) Discuss the association of compounds during the formation of solution. (12)
   (b) Describe separation of solid solutions in detail. (13)

3 (a) Derive expression for the rotational energy of diatomic molecule using quantum mechanical method. (15)
   (b) Discuss different types of vibrational modes in polyatomic molecules. (10)

4. (a) What is molar mass average. Give its significance in polymer chemistry. (8)
   (b) Write a note onGel Permeation Chromatography (GPC) for molar mass average determination. (17)

5. (a) What is origin of P, Q and R branches in rotational-vibrational spectrum? (10)
   (b) Write sampling technique and advantages of FT-IR spectroscopy. (05)
   (c) What is nature of light radiations? Classify different types of spectroscopy based on spectral region. (10)

6. (a) Explain classification of polymers on the basis of structure and application. (5)
   (b) What is polymerization? Give different methods of preparation briefly. (8)
   (c) Discuss the kinetics of the living polymerization. (12)

7. Write short note on any two of the followings: (12.5 + 12.5)
   a) Phosphorescence and determination of quantum yield
   b) Explain Fate of excited molecule through Jablonski diagram
   c) Condensation polymerization

UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Examination – 2022

Roll No. .....

Subject: Chemistry **Paper: II-B / II-2-N [Inorganic Chemistry (Additional)]** **Time: 3 Hrs.** **Marks: 100**

NOTE: Attempt any FOUR questions. All questions carry equal marks.

Q. No.1

a) Write down the detailed mechanism for the synthesis of Cis & Trans Platinum Complexes. **12**

b) Derive the mathematical relationship between disintegration constant and half life time of a radioactive substance. Also co-relate it with initial amount of radioactive material **13**

Q. No.2

a) Discuss the structure and function of metalloporphyrin. **10**

b) Describe different methods of detection and measurement of radioactivity. **15**

Q. No.3

a) What are non-aqeous solvents? Discuss various chemical reactions carried out in liquid Ammonia. **12**

b). Discuss the redox reactions with Inner Sphere Mechanism giving suitable examples. **13**

Q. No.4

a) Describe chemistry of mixed metal oxides. **12**

b) Differentiate between labile and inert complexes. Classify them on the basis of electronic configuration and size to charge ratio of metal ion involved? **13**

Q. No.5

a) Discuss the chemistry of ferrocene. **10**

b) What are substitution reactions? Give details of SN_1 and SN_2 reactions. **12**

Q. No.6

a) Discuss the chemistry of molten salts. **12**

b) Discuss the chemistry of 2 e donor system **13**

Q. No.7 Write note on any **TWO** of the followings: **(2x12½ = 25)**

i) Chemotherapy

ii) Classification of organometallic compounds

iii) Trans Effect

UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Examination – 2022

Roll No. .....

Subject: Chemistry Paper: II-C / III-2-N (Organic Chemistry) (Additional) Time: 3 Hrs. Marks: 100

NOTE: Attempt any FIVE questions. All questions carry equal marks.

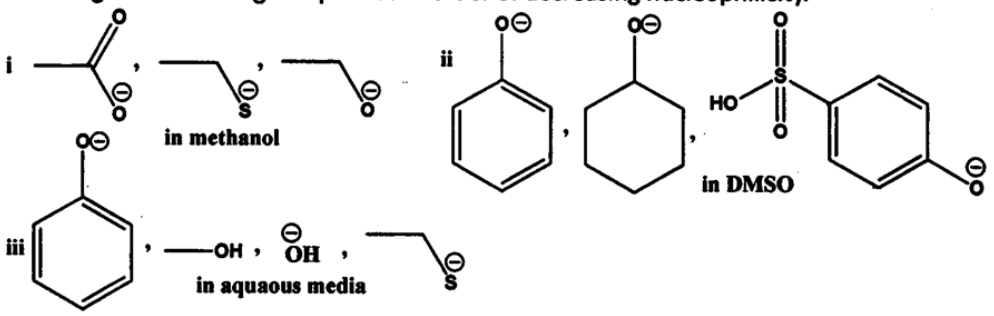
Q. No. 1.a) Explain why the chemical shift of the OH proton of a carboxylic acid is at a higher frequency than the chemical shift of an OH proton of an alcohol. **[3]**

b) Indicate the number of signals and the multiplicity of each signal in the NMR spectrum of each of the following compounds: **[9]**

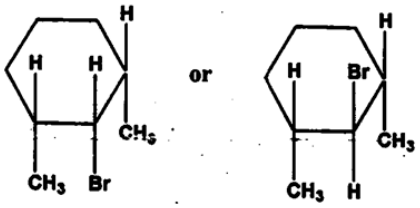
a $I(CH_2)_3Br$ **b** $Cl(CH_2)_3Cl$ **c** $I(CH_2)_2CHBr_2$

c) How can 1,2-, 1,3-, and 1,4-dinitrobenzene be distinguished by **[8]**
a. ^{1}H-NMR spectroscopy? **b.** ^{13}C-NMR spectroscopy?

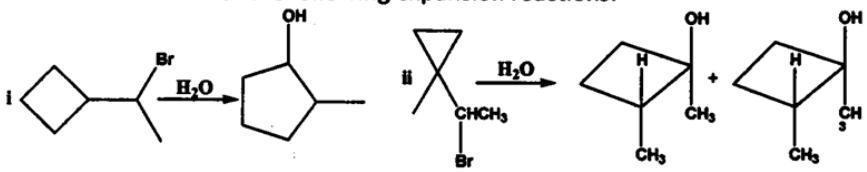
Q. No. 2. a) Arrange the following compounds in order of decreasing nucleophilicity. **[2x3=6]**



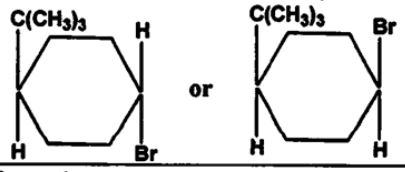
(b). Which of the following compounds would you expect to be more reactive in an S_N2 reaction? Explain briefly. **[04]**



(c). Propose a mechanism for each of the following expansion reactions. **[05]**

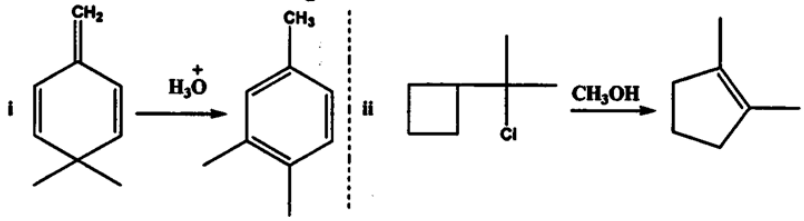


(d). Which of the following will react faster in S_N1 reaction and why? **[05]**



Q. No. 3. a). Three alkenes are formed from the E1 reaction of 3-bromo-2,3-dimethylpentane. Give the structures of the alkenes, and rank them according to the amount that would be formed. **[04]**

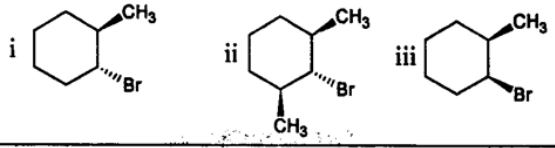
(b). Propose a mechanism for the following reactions. **[04]**



(c). Why do cis-1-bromo-2-ethylcyclohexane and trans-1-bromo-2-ethylcyclohexane form different major products when they undergo an E2 reaction? **[04]**

(d). Which isomer reacts more rapidly in an E2 reaction, cis-1-bromo-4-tert-butylcyclohexane or trans-1-bromo-4-tert-butylcyclohexane? Explain your choice. **[04]**

(e). Rank the following compounds in order of decreasing reactivity in an E2 reaction. **[04]**



Q. No. 4. a). How stereo-chemical evidences can help to figure out the reaction mechanism? Explain by giving at least two examples. **[05]**

(b). How isolation of intermediate can help to determine the reaction mechanism? Explain by giving at least two examples. **[05]**

(c). How isotopic labelling technique can help to figure out the reaction mechanism? Explain by giving at least two examples. **[05]**

(d). What is kinetic isotopic effect? Explain briefly. **[05]**

Q. No.5. Briefly explain terpenes and alkaloids? Draw all the steps involved in the biosynthesis of cholesterol. **[5+5+10]**

Q. No.6. a) How could you distinguish the PMR and CMR spectra of the following compounds? **[2.5 x 4 = 10]**

i. $CH_3OCH_2OCH_3$ ii. CH_3OCH_3 iii. $CH_3OCH_2C(CH_3)_2CH_2OCH_3$ iv. p-xylene

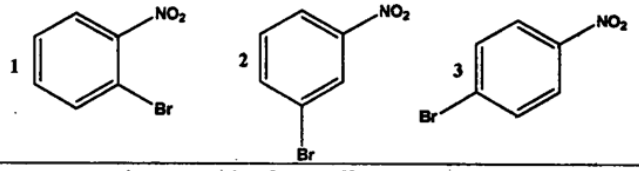
b) Define coupling constant and what are the different factors influencing the chemical shift and coupling constant values in ^{1}H-NMR spectrum. **[10]**

Q. No.7. a) How will you distinguish among the pri, sec, tert-butyl alcohols by mass spectrometry? **[5]**

b) How will you distinguish between benzene, toluene, m-xylene and mesitylene by PMR spectra? **[5]**

c) Write a short note on Quadruple mass analyser. **[5]**

d) How could PMR and CMR spectra distinguish the following compounds? **[5]**



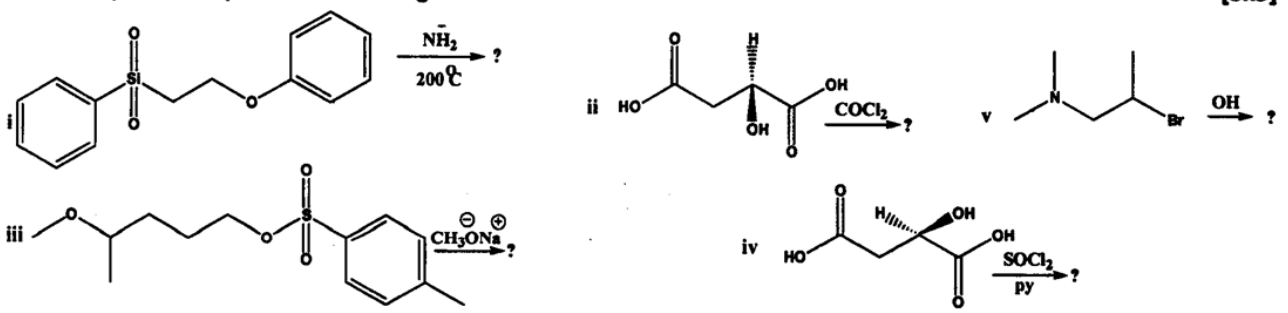
Q. No.8. a) What fragments are expected as a result of McLafferty rearrangement in the following compounds? **[10]**

i) 5- Methyl hexanal, ii) 4-Methyl-2-pentanone, iii) 2-Butylcyclohexanone,
iv) Butyl 2,2-dimethylpropanoate, v) 2-Ethylhexanoic acid.

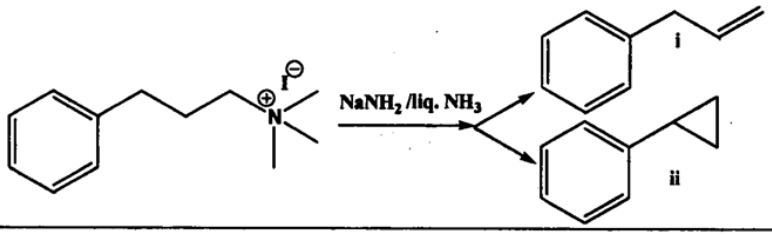
b) The mass spectrum of butyraldehyde shows a prominent peak at m/z 44. How will you explain it? **[5]**

c) The mass spectrum of phenetole exhibits a peak at m/z 94. How will you explain it? **[5]**

Q. No.9. a) Complete the following reactions with mechanism. **[3x5]**



(b). Predict the major product in follwing two possible reactions and describe any reaction determination method to support your answer. **[05]**



UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Examination – 2022

Roll No. .....

Subject: Chemistry Paper: II-D / IV-2-N [Biochemistry (Additional)] Time: 3 Hrs. Marks: 100

NOTE: Attempt any FIVE questions. All questions carry equal marks.

Q. 1. a. What are fat soluble vitamins? Explain in detail the occurrence, chemistry, metabolism, physiological functions and deficiency symptoms of vitamin A and D. (14)

b. Describe in detail the difference between normal and abnormal urine composition along with its biochemical effects. (6)

Q. 2. Discuss in detail the structure, chemistry and synthesis of immunoglobulin. Also discuss abnormalities related to immune system. (20)

Q.3. Discuss antibiotic, anti-viral, anti-malarial and anti-fungal drugs with suitable example. Also explain drug resistance. (20)

Q.4. What is meant by chromatographic techniques? Classify them according to mechanism of separation. Discuss in detail the chromatographic techniques required for the separation of specific protein from mixture of proteins. (20)

Q. 5. a. How the proteins can be extracted and partially purified by following different biochemical techniques. (12)

b. Differentiate between drug and medicine. Classify the drugs according to their mechanism of action. (8)

Q.6. Write notes on the followings. (20)

i. ELISA
ii. RIA
iii. PAGE
iv. HPLC
v. Muscle contraction and relaxation

Q.7. Enlist the difference between prokaryotic transcription and Eukaryotic transcription? Diagrammatically explain the post transcriptional and post translational modification in Eukaryotes. (20)

Q.8. Discuss in detail the use of bacteria in processing and preservation of food also discuss use of bacteria in detergent industries. (20)

Q.9. What is fermentation biotechnology? Discuss role of prokaryotes and fungi in the industry. How lactic acid is produced through fermentation? (20)

UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Examination – 2022

Roll No. .....

Subject: Chemistry **Paper: II-E / V-2-N (Analytical Chemistry) (Additional)** **Time: 3 Hrs.** **Marks: 100**

NOTE: Attempt any FOUR questions. All questions carry equal marks.

Q. 1	**a)**	Describe the basic principle of Infrared spectroscopy.	**7**
	b)	Briefly discuss modes of vibration which is being carried out in IR spectroscopy	**10**
	c)	Compare Raman spectroscopy with IR spectroscopy.	**8**
Q. 2	**a)**	What are the wavelength selectors? Explain their function in detail.	**10**
	b)	Explain the properties of electromagnetic radiations.	**07**
	c)	Describe the cells and sampling devices which can be used in uv/vis spectrophotometer.	**08**
Q. 3	**a)**	Highlight the limitations of atomic fluorescence.	**8**
	b)	Explain the actual phenomenon of atomic fluorescence?	**9**
	c)	How Inductive Coupled Plasma technique is suitable for metal analysis?	**8**
Q. 4	**a)**	Write a note on population inversion.	**08**
	b)	Explain three and four level laser systems.	**09**
	c)	Write an explanatory note on dye laser.	**08**
Q. 5	**a)**	Briefly discuss the NMR spectroscopy. Which type of solvent could be used in NMR spectrum?	**10**
	b)	How NMR is used for elucidation of structural features?	**15**
Q. 6	**a)**	Write down the detailed features of Electron Impact Ionization and Chemical Ionization in mass spectrometry?	**15**
	b)	How can you interpret the mass spectrum? Explain with examples.	**10**
Q. 7		Write notes on any three of the following:	**25**
	a)	Selection rules	
	b)	Chemical shifts	
	c)	Atomic energy levels	
	d)	Detection systems of mass spectrometry	
	e)	Mcklafferty rearrangement	

UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Examination – 2022

Roll No. .....

Subject: Chemistry Paper: II-F / VI-2-N (Applied Chemistry) (Additional) Time: 3 Hrs. Marks: 100

NOTE: Attempt any FOUR questions. All questions carry equal marks.

Q 01	(a)	Write down the principle and working of flame photometer, which types of elements can be analyzed using this technique?		15
	(b)	Briefly explain the isocratic and gradient elution in high performance liquid chromatography (HPLC).		05
	c)	Compare on-line and off-line methods of analysis in industry?		05
Q 02	(a)	Describe in detail the process of raw sugar manufacturing from sugar cane with flow sheet diagram.		18
	(b)	Explain the process of recovery of sugar from molasses.		07
Q 03	(a)	Discuss 'Viscos rayon' as textile fiber. How cellulose is converted to 'Viscos rayon'.		15
	(b)	Give the finishing processes for preparation of 100% cotton fiber.		10
Q 04	(a)	Briefly explain about different types of coal according to their carbon content, heating value and applications.		10
	(b)	Compare low temperature and high temperature carbonization processes and their main products.		10
	(c)	What do you understand about liquefied petroleum gas?		05
Q 05	(a)	Give the detailed account of the manufacturing of 'cast iron' and give the different reactions taking place in different zones of blast furnace.		10
	(b)	Define the term 'heat treatment' of steel. Why heat treatment of steel is conducted. Give the name of different heat treatment processes used for steel.		15
Q 06	(a)	Give a detailed account on classification of textile dyes.		15
	(b)	Describe the manufacturing of azo dyes.		10
Q 07		Write a short note on any three of the following		25
		i.	Theory of Electroplating	
		ii.	Manufacturing of Wrought iron	
		iii.	Dye intermediates	
		iv.	Significance of online analysis.	
		v.	Flow sheet diagram of raw sugar refining	

UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Examination – 2022

Roll No. .....

Subject: Chemistry **Paper: IV (Environmental Chemistry)** **Time: 3 Hrs.** **Marks: 100**

NOTE: Attempt any FOUR questions. All questions carry equal marks.

Q. 1	**(a)**	How poverty causes ENVIRONMENTAL DEGRADATION?	**(10)**
	(b)	What do you mean by the term EMISSION INVENTORY and TOXIC RELEASE INVENTORY? Why are these important?	**(15)**
Q.2	**(a)**	Discuss RADON and ASBESTOS as an indoor pollutant.	**(10)**
	(b)	What is GLOBAL WARMING? Discuss ENHANCED GREEN HOUSE EFFECT?	**(15)**
Q.3	**(a)**	Briefly discuss three types of WASTEWATER TREATMENT (primary, secondary and tertiary).	**(15)**
	(b)	How BOD and COD of wastewater can be reduced?	**(10)**
Q.4	**(a)**	What is EUTROPHICATION? How it can be controlled?	**(10)**
	(b)	What are OXYGEN DEMANDING WASTES?	**(5)**
	(c)	How SURFACTANT contributes to environmental degradation?	**(10)**
Q.5	**(a)**	What is AIR POLLUTION? Describe the SOURCES and IMPACTS of any five (5) AIR POLLUTANTS?	**(15)**
	(c)	Differentiate between POINT and NON-POINT SOURCES of pollution with examples?	**(10)**
Q.6	**(a)**	How HPLC techniques helps in organic pollution monitoring?	**(10)**
	(b)	Give the basic principles of UV/VIS & FT-IR. How these can be used as important monitoring tools?	**(15)**
Q.7		Write a note on any THREE of the following	**(8,8,9)**
	(i)	Reclamation of Soils	
	(ii)	Nuclear Energy	
	(iii)	Aerosols	
	(iv)	Ozone Depletion	
	(v)	Arsenic Poisoning	