



UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Exam – 2019

Subject: Chemistry

Paper: I-A Physical Chemistry (Special)

Roll No.

Time: 3 Hrs.

Marks: 100

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

Q.NO. 1.

(a) What is adsorption isotherm? Derive Langmuir adsorption isotherm for adsorption of a gas on solid surface. (12)

(b) What is catalysis? Discuss the kinetics of catalytic reaction of a gas on solid surface in detail. (13)

Q.NO. 2.

(a) Discuss the Eley-Rideal mechanism of catalytic reaction of two gases on solid surface. (15)

(b) What are GELS? Give their classification. (10)

Q.NO. 3.

Discuss the Eley-Rideal and Langmuir-Hinshelwood's mechanism for catalytic reaction involving two gases on solid surface. (25)

Q.NO. 4.

(a) Describe electrical properties of sols. (10)

(b) What is artificial radioactivity. Describe the rate of disintegration of radio-active elements. Give examples. (15)

P.T.O.

Q.NO. 5.

(a) Distinguish between Nuclear Fission and Fusion with the help of examples, which process is more energetic and why? (15)

(b) Explain the method of breaking of emulsions. (10)

Q.NO. 6.

(a) How the colloids differ from true solutions. (10)

(b) Describe the bombardment theory of Osmosis. (15)

Q.NO. 7. Write notes on any TWO of the followings. (25)

(a) Cyclotron

(b) Orientation theory of emulsification and wetting.

(c) Molecular weight determination by OSMOMETRY.



UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Exam – 2019

Subject: Chemistry Paper: II-A [Physical Chemistry (Additional)]

Roll No.

Time: 3 Hrs. Marks: 100

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

1. a) Write down characteristics of step growth polymerization. Also discuss kinetics of step growth polymerization in the absence of acid catalyst. (13)
b) Describe sedimentation method for determination of Average Molar mass. (12)
2. a) What is Laser? Write down its principle and discuss production of laser by pumping, spontaneous and stimulated emission. (13)
b) Discuss basic laws of photochemistry. (12)
3. a) Discuss non radiative relaxation processes with the help of Jablonski diagram. (10)
b) Derive expression for fluorescence life time in the absence of quencher. (15)
4. a) Discuss the instrumentation and applications of visible spectroscopy. (12)
b) Define molecular spectroscopy. Write a detailed note on the applications of spectroscopy. (13)
5. a) Explain thermodynamics for real solutions. (13)
b) What are the conditions of equilibrium between phases? (12)
6. a) Derive energy expression for harmonic oscillator? How can harmonic character effect energy levels of a harmonic oscillator? (15)
b) What is Raman spectroscopy? Discuss pure Raman spectra of linear molecules. (10)
7. Write a note on two of the followings: (12.5 + 12.5)
 - (i) Kinetics of copolymerization
 - (ii) Photochemical reactions
 - (iii) Stark effect



UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Exam – 2019

Roll No.

Subject: Chemistry

Paper: I-B Inorganic Chemistry (Special)

Time: 3 Hrs.

Marks: 100

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

Q. No.1	a) Describe theoretical arguments in favor as well as against d orbital participation by non metals	15
	b) How 3c-4e bond model is helpful in explaining the shapes of different types of inorganic molecules?	10
Q. No.2	a) What are Silicates? Discuss their chemistry in detail.	15
	b) i. SiCl_4 hydrolyses while CCl_4 is inert towards water. Justify this statement	2×5
	ii. Which the following anion is bigger in size and why? H^- or Cl^-	= 10
	iii. What is $d\pi-p\pi$ bonding? Exemplify it.	
	iv. Why aliphatic phosphines need protection from atmospheric oxygen?	
	v. Define the term S-inert pair effect.	
Q. No.3	a) What is the basic principle of Flame emission spectroscopy? Discuss some of its important applications.	10

P.T.O.

	b) Describe use of p-orbitals in π -bonding with suitable examples.	15
Q. No.4	a) What is the role of thermodynamics in interpretative chemistry? Explain it with example.	15
	b) Discuss the chemistry of Rubeanic acid and Dimethylglyoxime.	10
Q. No.5	a). How lattice energy values can be used as criteria of bond type? What are the drawbacks of this concept?	12
	b) What is Borazine? Describe its preparation and also compare its properties and structure with Benzene.	13
Q. No.6	a) What is reluctance behavior? Explain it with reference to non metals	12
	b) What are the types of stability? Explain any one of them with mathematical interpretation?	13
Q. No.7	Write note on any TWO of the followings:	2x12.5 = 25
	i. Diagonal relationship	
	ii. Principle and instrumentation of ICP	
	iii. EDTA titrations	



UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Exam – 2019

Subject: Chemistry Paper: II-B [Inorganic Chemistry (Additional)]

Roll No.

Time: 3 Hrs. Marks: 100

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

- Q. No.1 a) What are the applications of Trans effect? How it can be explained by different theories? 15
- b) How can one detect and measure radioactivity of a sample? What are the units to measure radioactivity? 10
- Q. No.2 a) Discuss the chemistry of π -allyl organometallic compounds with suitable examples. 12
- b) What is half-life of radioactive decaying material? How it is mathematically related to decay constant and initial concentration of substance? 13
- Q. No.3 a) Describe mechanism of cis-platin as anticancer drug? 15
- b) How substitution reactions occurred in octahedral complexes? 10
- Q. No.4 (a) Explain the specific properties of metalloporphyrin ring containing compounds? 10

P.T.O.

	(b) Explain complexation reactions in water, Liq. SO ₂ and Liq. BrF ₃ .	06
	(c) What are the toxic effects of non metal oxides on health and environment?	09
Q. No.5	a) Explain the outer and inner sphere electron transfer reaction mechanism	10
	b) Explain the characterization of organometallic compounds with the help of IR, NMR, mass spectrometry.	9
	c) Discuss the magnetic properties in mixed metal oxides?	6
Q. No.6	a) What are Metallocenes? Describe the chemistry of chromocene.	13
	b) How nitrogen fixation occurred in bacteria and in vitro?	12
Q. No.7	Write note on any TWO of the followings:	2x
	(a) High temperature superconductors	12.5
	(b) Non heme iron sulphur proteins	=25
	(c) Electrode potential and its measurement	

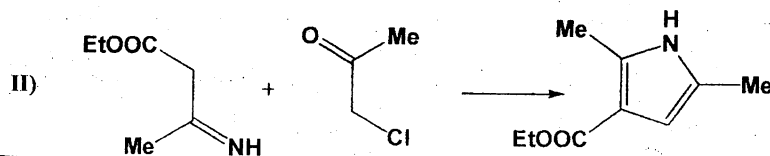
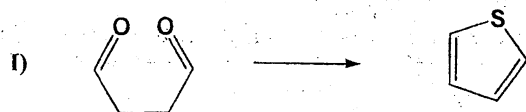


NOTE: Attempt any FIVE questions. All questions carry equal marks.

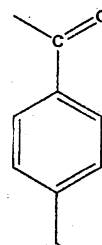
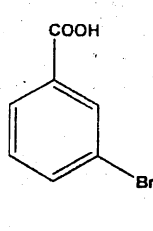
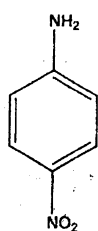
Q.1. A) At which position does the substitution occur for the following reaction? Explain your answer and give two examples for each case. [10]

- I) Electrophilic substitution reaction of Pyrrole.
- II) Nucleophilic substitution reaction of Pyridine.

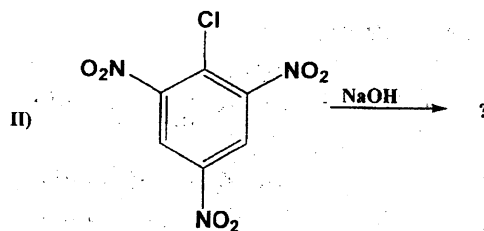
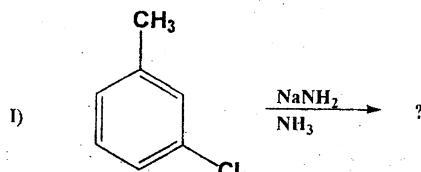
B) How can you bring about following conversions? Write complete mechanism for all the steps involved. [10]



Q.2. A) Outline all steps with mechanisms involved in the synthesis of following compounds from benzene. [12]



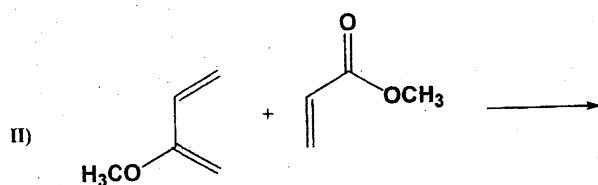
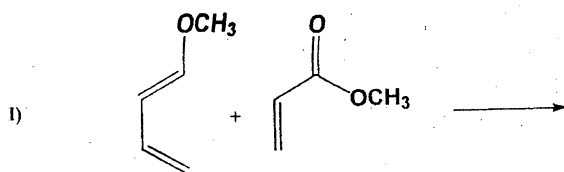
B) Complete the following reactions and draw mechanisms for all steps involved. [8]



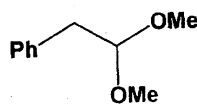
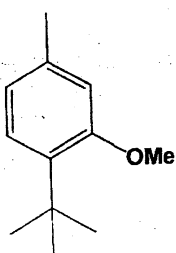
Q.3. A) By using energy level correlation diagram how can you explain that thermal electrocyclic reactions involving $4n$ electrons proceed in a conrotatory fashion while photochemical electrocyclic reactions involving $4n$ electrons proceed in a disrotatory fashion? [10]

B) By using frontier molecular orbital approach (FMO), explain the thermal and photochemical [1, 3] alkyl shift. [6]

C) Draw the all possible products of following cycloaddition reactions and indicate the major product? [4]

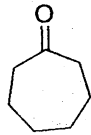
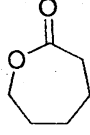
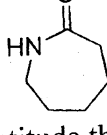


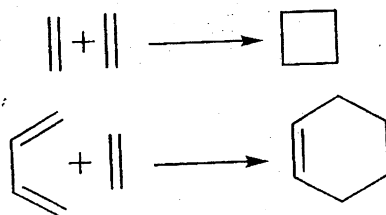
- Q.4. A) What is phase transfer catalysis? How the crown ethers work as phase transfer catalysts? [5]
 B) What are group transfer reactions? Give two examples. [5]
 C) Explain Merrifield Solid-Phase Peptide Synthesis. Describe all steps involved. [10]
- Q.5. A) What are protecting groups? Describe the addition and removal of three different protecting groups for alcohols. [10]
 B) Suggest a retrosynthetic analysis and synthesis for each of the following target molecules. [6]



(I)

(II)

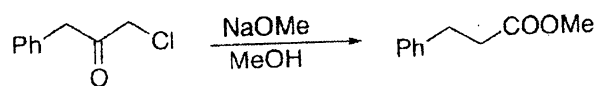
- C) Describe the stereoselectivity of Wittig reaction. [4]
- Q.6. A) How will you synthesize the following compounds from cyclohexanone? Write complete mechanism for each step involved. [15]
-   
- B) Explain why aryl groups have far greater migratory aptitude than alkyl groups and hydrogen in Wagner-Meerwein rearrangement? [5]
- Q.7. A) Arrange the following in order of reactivity towards aromatic electrophilic substitution? Explain your answer. [5]
- a) Benzene b) Pyridine c) Pyrrole
 d) Furan e) Thiophene
- B) What is Dakin reaction? Draw complete mechanism and explain the effect of pH and relative position of hydroxyl and carbonyl groups on ring. [10]
 C) Draw the complete mechanism of Baeyer-Villiger Reaction. [5]
- Q.8. A) Explain the structure of singlet carbene and triplet carbene. [5]
 B) What are different methods to generate nitrene? [5]
 C) Describe the Hantzsch synthesis of Pyridine. [10]
- Q.9. A) What is Arndt-Eistert Synthesis? Draw complete mechanism of all steps. [10]
 B) Which of the following reactions will proceed thermally and which will undergo photochemically? Explain your answer by using frontier molecular orbital (FMO) approach. [10]





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

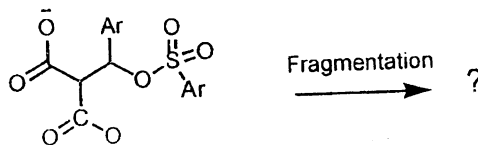
Q. No. 1. a) Give mechanism of the following transformation, identify the reaction intermediate specie and also the name of the reaction. [04]



b) Explain the difference between specific and general base catalysis with at least one example each. [05]

c) Give names and structures of any four reactive intermediates. [02]

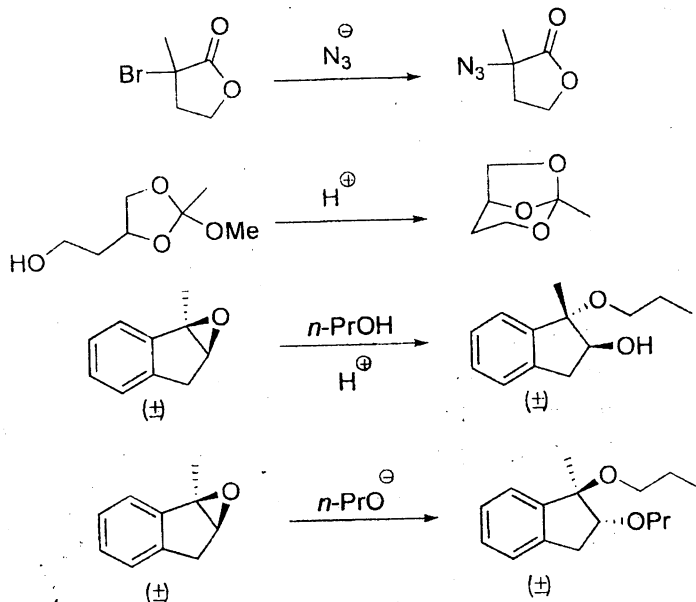
d) What products do you expect from following reaction? [04]



e) Describe Kinetic Deuterium Isotope Effect, briefly, with examples. [05]

Q. No. 2. a) What are soft and hard nucleophiles, explain the role of nucleophile in S_N1 and S_N2 reactions. [08]

b) Explain with reasons by giving mechanisms whether these reactions will be S_N1 or S_N2 . [3×4 = 12]

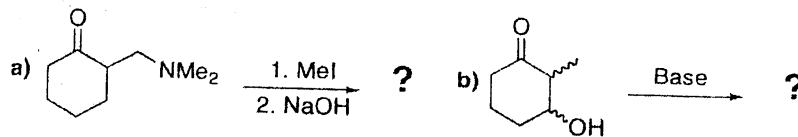


Q. No. 3. a) Briefly explain the different factors influencing the chemical shift values in ^1H - and ^{13}C -NMR spectrum of organic compounds. (15).

(b) Define Chemical Shift and how it is measured. Why TMS is used as reference in NMR spectroscopy? (5).

Q. No. 4. a) Draw the product of the following reaction and comment on the position of double bond in each product. [04]

P.T.O.



b) What kind of substrates prefer E1 elimination and why.

[04]

c) Compare the following with special reference to elimination reactions;

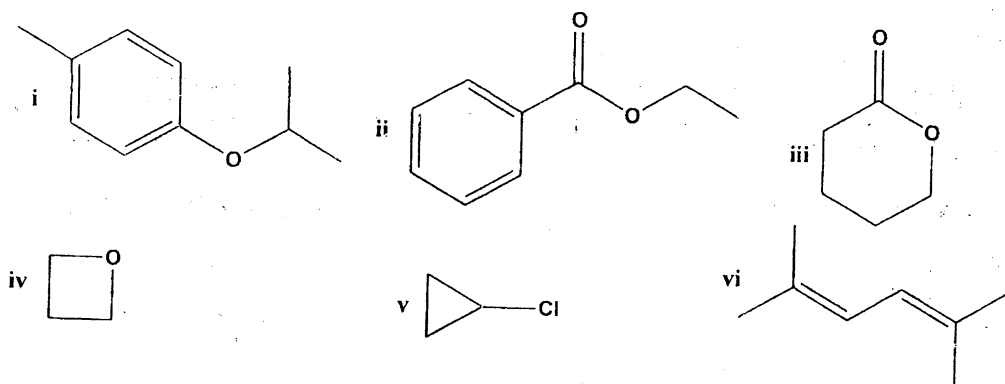
[3x4 = 12]

i) Stereospecific and stereoselective reactions product

ii) Thermodynamic versus kinetic control

iii) Hofmann versus Saytzeff

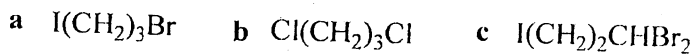
Q. No. 5. a) How many signals would you expect to find in the PMR and CMR spectrum of each of the following compounds? What would be the chemical shift values, multiplicity and relative area of each signal? [20]



Q. No. 6.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]

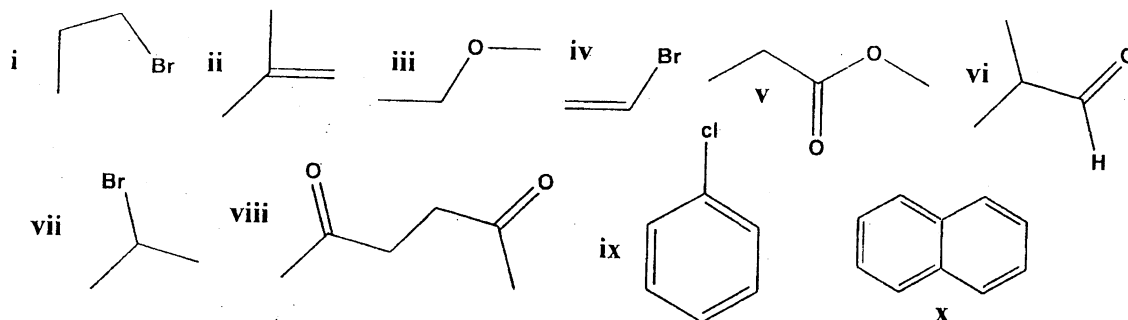


c) How can 1,2-, 1,3-, and 1,4-dinitrobenzene be distinguished by

[8]

a. 1H -NMR spectroscopy? b. ^{13}C -NMR spectroscopy?

Q. No. 7. a). How many signals would you expect to find in the PMR spectrum of each of the following compounds? What would be the chemical shift values, multiplicity and relative area of each signal? [20]



Q. No. 8. a) How a molecular ion undergo fragmentation by simple cleavage, α -cleavage, β -cleavage, elimination, and RDA reactions. Give suitable examples in each case. [10]

b) What are the various parts of a typical mass spectrometer, write a brief note on quadrupole mass analyser in mass spectrometers for routine analysis of organic molecules now a days. [10]

Q. No. 9 write a short note on the following.

[6+7+7]

i. Cholesterol

ii. Alkaloids

iii. Terpenes



UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Exam – 2019

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) What is Air Quality Index and discuss its importance for warning/alarm mechanism for different cities? (10)
(b) Discuss the ACTIVATED SLUDGE PROCESS for sewage treatment. (10)
(c) Discuss the mechanism and effects of CFCs on the ozone layer? (5)
- Q.2** (a) How does reverse osmosis differ from a simple sieve separation or ultrafiltration process? (8)
(b) Give one major advantages and major disadvantages of using chlorine dioxide for water disinfection. (9)
(c) What are the main environmental problems caused by Hg? (8)
- Q.3** (a) Compare and contrast the COD and BOD methods. What are their advantages and disadvantages? (8)
(b) What is the most abundant hydrocarbon in the atmosphere? What is its significance in relation to pollutant formation in the atmosphere? (8)
(c) Write a note on Eutrophication? Explain why it is dangerous of aquatic animals? (9)
- Q.4** (a) Although water is one of the most abundant resources, concerns are being expressed about its availability in the future. Discuss? (8)
(b) How MINING activities contribute soil pollution? (8)
(c) List the anthropogenic and natural sources of NO_x. And discuss the effects of NO_x pollution? (9)

P.T.O.

- Q.5** (a) How the concept of GREEN CHEMISTRY helps to protect our environment? (12)
- (b) Which control strategies would you suggest to reduce the frequency and intensity of photochemical smog in urban areas? (8)
- (c) Write down the discharge limits for industrial and household wastewater? (5)
- Q.6** (a) Explain how O_3 is formed in the atmosphere. What are the consequences of O_3 pollution? How can O_3 pollution be controlled? (10)
- (b) Write a note on Renewable energy sources and their environmental consequences? (8)
- (c) What is the distinction between the symbols * and • in discussing chemically active species in the atmosphere? (7)
- Q.7** (a) Differentiate between the following pairs of concepts: (8)
1. Primary pollutant and secondary pollutant
 2. Ambient monitoring and source testing.
- (b) How are the chelating agents that are produced from soil microorganisms involved in soil formation? (8)
- (c) Discuss the role of NH_3 in the biogeochemical cycle of nitrogen? (9)



UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Exam – 2019

Subject: Chemistry

Paper: I-D: Bio-Chemistry (Special)

Roll No.

Time: 3 Hrs.

Marks: 100

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

1. Explain the oxidative phosphorylation. Describe electron transport chain and formation of ATP (20)
2. a) Discuss the trans-methylation of methionine and explain how it is involved in the biosynthesis of Cysteine and Cystine (12)
b) Write in detailed Urea Cycle Decarboxylation (8)
3. (a) Describe in detail the hexose monophosphate shunt (10)
(b) Write down the reactions of Uronic acid pathway (10)
4. a) Explain the biosynthetic steps along with their enzymes involved in the formation of Inosine monophosphate (IMP) and how it converted into AMP and GMP. (12+8)
5. Explain the chemistry, synthesis and biological function of hormone which related with diabetes mellitus and produced in pancreas. (20)

P.T.O.

6. (a) Explain briefly metabolism of essential fatty acids and their metabolic disorders (10+5)
(b) Describe briefly digestion and absorption of Lipids (5)
7. a) Write in detailed about the two hormones which produce by thyroid gland (10)
b) Disorders linked to serum urate levels (10)
8. a) Briefly describe the synthesis RNA and its splicing (12)
b) Discuss briefly Gluconeogenesis (8)
9. Write note of followings two. (10+10)
 - a) Hormonal control mechanisms
 - b) Glycolysis
 - c) Uncouplers of oxidative phosphorylation



UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Exam – 2019

Subject: Chemistry Paper: I-D: Bio-Chemistry (Special)

Roll No.

Time: 3 Hrs. Marks: 100

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

1. Explain the oxidative phosphorylation. Describe electron transport chain and formation of ATP (20)
2. a) Discuss the trans-methylation of methionine and explain how it is involved in the biosynthesis of Cysteine and Cystine (12)
b) Write in detailed Urea Cycle Decarboxylation (8)
3. (a) Describe in detail the hexose monophosphate shunt (10)
(b) Write down the reactions of Uronic acid pathway (10)
4. a) Explain the biosynthetic steps along with their enzymes involved in the formation of Inosine monophosphate (IMP) and how it converted into AMP and GMP. (12+8)
5. Explain the chemistry, synthesis and biological function of hormone which related with diabetes mellitus and produced in pancreas. (20)

P.T.O.

6. (a) Explain briefly metabolism of essential fatty acids and their metabolic disorders (10+5)
(b) Describe briefly digestion and absorption of Lipids (5)
7. a) Write in detailed about the two hormones which produce by thyroid gland (10)
b) Disorders linked to serum urate levels (10)
8. a) Briefly describe the synthesis RNA and its splicing (12)
b) Discuss briefly Gluconeogenesis (8)
9. Write note of followings two. (10+10)
 - a) Hormonal control mechanisms
 - b) Glycolysis
 - c) Uncouplers of oxidative phosphorylation



UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Exam – 2019

Subject: Chemistry

Paper: II-D [Biochemistry (Additional)]

Roll No.

Time: 3 Hrs.

Marks: 100

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

- Q. 1. a. Explain the structure and detoxification mechanism of liver. (10)
- b. Why water metabolism and acid base balance are important in biological system? (10)
- Q. 2. Define vitamins and differentiate between water and fat soluble vitamins? Discuss the chemistry, occurrence, physiological functions and deficiency symptoms of Vitamin B-complex in detail. (20)
- Q. 3. a. Describe the general composition of blood, urine and CSF. (12)
- b. Write down the steps of haemoglobin synthesis in detail. (8)
- Q. 4. What are the minerals? Discuss different types of minerals, and elaborate the occurrence, metabolism and daily requirements of any two macro minerals. (20)
- Q. 5.a. What is fermentation biotechnology? Write down the bacterial applications in food industry (10)
- b. Elaborate the steps involved in Lactic acid production. (10)

P.T.O.

Q. 6. What are the general methods for extraction of proteins? What are the principles of Gas chromatography and HPLC (20)

Q. 7. What are immunoglobulins? How complement system is involved in immunity and describe some abnormalities of immune system. (20)

Q. 8. What is gene expression? How operon model is involved in regulation of gene expression in prokaryotes and eukaryotes. (20)

Q.9. Write notes on the following: (20)

1. Restriction Enzymes
2. Antiviral drugs
3. Bacteriophage
4. ELISA



UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Exam – 2019

Roll No.

Subject: Chemistry

Paper: II-F [Applied Chemistry (Additional)]

Time: 3 Hrs.

Marks: 100

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

- Q.1 (a) How sugar is manufactured from sugar cane? Explain the industrial process with the help of suitable flow sheet diagrams. (18)
- (b) How sucrose can be recovered from Molasses? (7)
- Q.2 (a) Explain the principal of electroplating. What are the different processes involved in electroplating. (13)
- (b) Explain the manufacturing of cast iron and steel. (12)
- Q.3 (a) Explain the working principle of HPLC. (13)
- (b) Explain the classification of techniques with respect to automation. (12)
- Q.4 (a) Describe the process of destructive distillation of coal. (15)
- (b) Describe the distillation of coal tar. (10)

P.T.O.

- Q.5** (a) Explain the manufacturing of various dye intermediates. (13)
- (b) Describe the coloring process for wool and cotton fabric. (12)
- Q.6** (a) Describe in detail the manufacturing of nylons. (13)
- (b) Describe the finishing process for cotton fabrics. (12)
- Q.7** Write a short note on any THREE of the following (8,8,9)
- (i) Nickel Plating
 - (ii) Manufacturing of viscose rayon
 - (iii) Natural Gas
 - (iv) Heat treatment of steel



UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Exam – 2019

Roll No.

Subject: Chemistry

Paper: I-E: Analytical Chemistry (Special)

Time: 3 Hrs.

Marks: 100

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

- Q1. a) Discuss the detail the working principle of FID along with comparison of Sensitivities of the detectors used in GC. 10
b) Discuss selection rules for selecting mobile phase for HPLC. 05
c) Discuss different types of columns used in GC and GLC, what factors affects the column efficiency. 10
- Q2. a) Discuss the details of each component used in HPLC Instrument. 15
b) Write down the working principle of Thermal Conductivity Detector. 05
c) Which equipment you will suggest for the quality control monitoring of hydrocarbons in oil refinery. 05
- Q3. a) Discuss the working principle of membrane electrodes. 10
b) Explain the working principle of the Metallic Indicator Electrodes along with examples. 15
- Q4. a) In the presence of standard hydrogen electrode, why we need reference electrode. 05
b) Write a note on the working principle of glass membrane electrode for the measurement pH of an unknown solution. 15

P.T.O.

- Q5. a) Discuss various factors which affect Diffusion Current and half wave potential. 10
b) Write a note on pulse polarographic techniques, why they are more sensitive than Conventional techniques. 15
- Q6. a) Discuss the steps involved in anodic stripping voltametry and its Instrumentation. 13
b) Write a note on amperometric titrations. 12
- Q7. Write a note on 25
i) DTA ii) DSC iii) TGA
iii) Application of Conductometry other than Titrations
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UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Exam – 2019

Subject: Chemistry

Paper: II-E [Analytical Chemistry (Additional)]

Roll No.

Time: 3 Hrs.

Marks: 100

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

- Q.1 a) Write down the instrumentation and their function in detail of FTIR. 10
- b) What is meant by selection rule? Explain with examples. 10
- c) Applications of Infrared spectroscopy 5
- Q.2 a) Define the term spectroscopy. Describe the radiation sources and monochromators in UV-Visible spectroscopy 10
- b) Explain the atomic and molecular energy levels 10
- c) Draw the optical diagram of single and double beam spectrophotometer 5
- Q.3 a) Discuss the different types of atomic fluorescence. 8
- b) How plasma is generated in ICP? Explain multielement detection in ICP. 10
- c) Elaborate the energy level diagram of fluorescence 7

P.T.O.

Q.4 a) What is the basic principle of laser operation	5
b) How NMR technique is useful to identify the structural unit	10
c) Explain the chemical shift and spin-spin coupling in NMR	10
Q.5 a) Write down the detailed features of MALDI?	15
b) Briefly explain the mass analyzers in mass spectrometry	10
Q.6 a) What is the basic principle of NMR spectroscopy. Explain the relaxation effects	15
b) What is McLafferty arrangements in Mass spectrometry. Give examples	10
Q.7 write notes: i. Shielding effects in NMR	9
ii. Ruby Laser	9
iii. Chemical Ionization Source	7



UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – II Annual Exam – 2019

Subject: Chemistry

Paper: I-F: Applied Chemistry (Special)

Roll No.

Time: 3 Hrs.

Marks: 100

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

Q. 01	a. What is isomerization and how it is utilized in petroleum industry?	13
	b. Discuss the various theories of the origin and the related processes of formation of petroleum underground.	12
Q. 02	a. What is chrome tanning? Briefly discuss all the steps involved in the process of chrome tanning.	13
	b. Explain the post-tanning operations used in leather industry	12
Q. 03	a. Write down complete process of conversion of vegetable oil in to vegetable Ghee. Support your answer with schematic diagrams and chemical reactions involved.	12
	b. How oxidation and nitration of benzene and xylene can be carried out. Also give their industrial significance.	13
Q. 04	a. How pulp is prepared from bagass and bamboo?	12
	b. Give brief description of raw materials and waste chemicals in paper industry	13
Q. 05	a. Explain the urea manufacturing process with the help of labeled flow sheet diagram elaborating all the production steps involved.	15
	b. Name the calcium fertilizers and how do you manufacture calcium cyanamide?	10
Q. 06	a. Give a detailed description on polymer classification with suitable examples and repeat units.	12
	b. What is addition polymerization? Explain its various types, giving chemical mechanism in each case	13
Q. 07	Write short note on the following.	
	a. Thermosetting Resins	05
	b. Surfactants	05
	c. Lubricants and paints	05
	d. Application of fertilizers	05
e. Rancidity	05	