

UNIVERSITY OF THE PUNJAB



Part-II A/2017
Examination:- M.A./M.Sc.

Roll No.

Subject: Chemistry [Special Written] (Old & New Course)
PAPER: I-A (Physical Chemistry)

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

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

- Q.1. What are TRACERS? Discuss their principle and applications. 25
- Q.2(a) What is radioactivity? Discuss the kinetics of disintegration of a radioactive substance. 15
- (b) Prove that half life period of radioactive substance is independent of its initial atoms. 10
- Q.3. Discuss the Eley-Rideal mechanism of catalytic reaction of two gases on solid surface. 25
- Q.4. Explain relationship between osmotic pressure and vapour pressure. How would you determine the molecular weight of macromolecules by Osmometry? 25
- Q.5. What are emulsions? Give classification of emulsions. How can you identify W/O and O/W emulsions? 25
- Q.6. What is SOL? Give classification of SOL. Discuss electrical properties of SOL in detail. Explain dispersion methods for preparation of SOL. 25
- Q.7. Write short notes on any TWO of the following: 25
- Kinetics of enzyme reactions
 - Electro-osmosis and its applications
 - Applications of colloids in daily life



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Part-II A/2017
Examination:- M.A./M.Sc.

Roll No.

Subject: Chemistry (Special Written) (Old & New Course)
PAPER: I-B (Inorganic Chemistry)

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

The question paper will not be accepted unless the particulars heading from the syllabus is mentioned against each question in the column specified for the purpose.

Serial No.	Questions	No. of Marks
	Note: Attempt any FOUR questions. All questions carry equal marks.	
Q. No.1	a) Non metals involve d orbital in bonding. Illustrate this statement with few experimental evidences.	15
	b) Discuss the chemistry of Dimethylglyoxime and Cupferron.	10
Q. No.2	a) What are Silicones? Describe their preparation, properties and uses.	15
	b) i. CCl_4 is inert towards water. Justify this statement.	2×5
	ii. Which of the following has more effective π -bonding and why. P As Sb	= 10
	iii. Lithium resembles magnesium diagonally. Justify the statement	
	iv. Why aliphatic phosphines need protection from atmospheric oxygen?	
	v. Define the term S-inert pair effect.	
Q. No.3	a) How 3c-4e bond model is helpful in explaining the shapes of different types of inorganic molecules?	10
	b) What are the types of stability? Explain any one of them with mathematical interpretation?	15
Q. No.4	a) What is the role of thermodynamics in interpretative chemistry? Explain with example.	15
Q. No.5	b) Discuss working of graphite furnace in AAS.	10
	a). Derive Kapustunskii Equations for calculating lattice energy in the absence of crystallographic data?	12
		13
	b) What is Borazine? Describe its preparation and also compare its properties, structure with Benzene.	
Q. No.6	a) What are Zeolites? Describe natural and synthetic Zeolites with their uses in daily life.	12
		13
	b) Describe use of p-orbitals in π -bonding with suitable examples.	12
Q. No.7	Write note on any TWO of the followings:	
	i. specificity of organic reagents	2×12.5
	ii. Reluctance behavior of p block element	= 25
	iii. Applications of Flame photometry	

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Part-II A/2017
Examination:- M.A./M.Sc.

Roll No.

Subject: Chemistry [Special Written] (Old & New Course)
APER: I-C (Organic Chemistry)

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

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

Q.1	Give answers to the following short questions. a) What major products would you expect from the reactions of quinoline and isoquinoline with HNO ₃ /H ₂ SO ₄ ? Justify your answer. b) What product would you expect from the reaction of 1-bromo-4-nitrobenzene with potassium cyanide. Justify your answer with the help of mechanism. c) Explain the terms conrotation and disrotation with suitable examples. d) The neighboring provides anchimeric assistance to a leaving group in a rearrangement reaction when needed? Explain with the help of examples.	4 × 5
Q.2	How will you bring about following conversion? Write down the name and mechanism of rearrangement involved in each case. i) Acetone into pinacolone ii) Butyric acid into propanamine iii) Acetophenone into phenol iv) Acetophenone into aniline	4 × 5
Q.3	Design suitable syntheses for the following heterocyclic ring systems show all the steps with mechanisms. i) Pyridazine ii) Pyrazine iii) Pyridine iv) Pyrimidine	4 × 5
Q.4	a) Discuss the structures of carbenes, nitrenes and benzyne. b) Give evidences in favour of carbenes, nitrenes and arynes as reactive intermediates. c) Discuss the comparative stability of singlet and triplet carbenes.	3 × 2 3 × 4 02
Q.5	Discuss the role of protecting groups in organic synthesis.	20
Q.6	a) Thermal electrocyclization of a conjugated polyene with (4n + 2) π electrons proceeds through disrotation while photochemical prefers conrotation. Explain with the help of Orbital Symmetry Conservation Theory. b) By using FMO approach how can you explain that in thermal reaction [1,5] shift of hydrogen in dienes occurs suprafacially while [1,3] hydrogen shift antarafacially.	10 10
Q.7	Design suitable syntheses for the preparation of 2,5-dimethylfuran, 2,4-dimethylpyrrole and 3,4-diphenylthiophene and diethyl pyridine-3,5-dicarboxylate. Give the mechanism in each case.	4 × 5
Q.8	How would you prepare the following compounds from naphthalene? i) Naphthalen-2-amine ii) Naphthalene-2-carboxylic acid iii) Phenanthrene iv) 1-Naphthol	4 × 5
Q.9	a) How would you prepare the following compounds starting from benzene? Show all the steps. i) <i>m</i> -Methylbenzoic acid ii) 3-Bromotoluene iii) 4-Bromobenzonitrile iv) 1,3-Dibromobenzene b) Discuss the differences, similarities and limitations of Friedel Crafts alkylation and acylation reactions. Decorate your answer with examples.	4 × 4 04

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Part-II A/2017
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Subject: Chemistry [Special Written] (Old & New Course)
PAPER: I-E [Analytical Chemistry]

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

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

- Q1. a) Discuss the detail note on the sensitivity of detectors used in GC. 10
b) Write a note on Columns and stationary phases and specialized stationary phases used in GC. 10
c) How will you calculate column efficiency and coating efficiency in GC column. 05
- Q2. a) Discuss the solvent delivery systems used in HPLC. 10
b) Write a note on chemically bonded stationary phases for HPLC. 10
c) Discuss the effect of temperature and diffusion on HPLC results. 05
- Q3. a) How membrane electrodes works. What is acidic and alkaline error. 10
b) Explain the working of the Indicator Electrodes of the Kind. 10
c) Write a note on membrane electrodes for ions other than proton. 05
- Q4. a) Write a not on the electrodes of Redox type. 07
b) Discuss a note on the applications of Conductometry in Chemistry. 07
c) Discuss the applications of Polarography for both inorganic and organic compounds. 11
- Q5. a) Write a note on differential pulse polarographic techniques, why they are more sensitive than Conventional techniques. 10
b) Discuss various factors which affect Diffusion Current and half wave potential. 15
- Q6. a) Why anodic stripping voltametry more sensitive than other polarographic techniques. 05
b) Write a note on amperometric titrations with single and twin micro electrodes. 20
- Q7. 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



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Part-II A/2017
Examination:- M.A./M.Sc.

Roll No.

Subject: Chemistry (Old & New Course)
PAPER: II-D [Biochemistry (Additional)]

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

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

- Q. 1. What is the role of haemoglobin in biological system? Elaborate its biosynthesis. (20)
- Q. 2. What do you mean by Immunity? Discuss cell mediated and humoral response in detail. (20)
- Q.3. Describe the structure of kidney? How it helps in osmoregulation and detoxification processes? (20)
- Q.4. What are fat-soluble vitamins? Discuss the occurrence, chemistry, metabolism, physiological functions, deficiency symptoms and requirements of vitamin A. (20)
- Q. 5. What is fermentation biotechnology? Write a detailed note on the industrial production of Lactic acid through fermentation. (20)
- Q.6. Discuss antibiotics, antiviral, antimalarial and antifungal drugs with suitable examples. (20)
- Q.7. (a) Describe the biological importance of buffers. How buffers work? (5+5)
- (b) Explain Radioisotopes? Write practical applications of radioisotopes in the field of biochemistry. (2+8)
- Q.8. Discuss the principle and procedure of SDS PAGE and ELISA? (10+10)
- Q.9. Write notes on the following: (20)
1. Restriction Enzymes
 2. Genetic Code
 3. Viruses
 4. Gas Chromatography



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Part-II A/2017
Examination:- M.A./M.Sc.

Roll No.

Subject: Chemistry (Old & New Course)
PAPER: II-F [Applied Chemistry (Additional)]

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

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

- Q.1 (a) Explain the manufacturing of sugar from sugar cane. Give flow sheet of the process. (18)
- (b) How sucrose can be recovered from Molasses? (7)
- Q.2 (a) Describe in detail the destructive distillation of coal. (13)
- (b) How coal chemicals are recovered from the gaseous mixture coming out from coke ovens? (12)
- Q.3 (a) Give the basic principle and applications of electroplating. (13)
- (b) Explain Nickel plating in detail. Give specific applications. (12)
- Q.4 (a) What is the principle of electroplating? Explain different processes involved in chrome plating. (15)
- (b) Describe in detail the electrochemical theory about corrosion. How corrosion can be controlled? (10)
- Q.5 (a) How Nylon 6,6 is manufactured? Give flow sheet of the process. (15)
- (b) How cellulose acetate and Viscose Rayon are manufactured? Write chemical equations. (10)
- Q.6 (a) What is HPLC? Explain its principle and general instrumentation. (13)
- (b) What are the major applications of AAS? Give limitations of the Technique. (12)
- Q.7 Write a short note on any TWO of the following (12,13)
- (i) Theories of corrosion
- (ii) Gas Chromatography
- (iii) Manufacturing of Cast Iron

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Part-II A/2017
Examination:- M.A./M.Sc.

Roll No.

Subject: Chemistry (Old & New Course)
PAPER: II-B [Inorganic Chemistry (Additional)]

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

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

- Q. No.1 a) Compare chemical reactions occurring in liquid SO_2 and liquid NH_3 15
b) How Nitrogen fixation occurs in vivo and in vitro? Explain with examples? 10
- Q. No.2 a) What are Metallocenes? Describe the structure and properties of Ferrocene. 15
b) Discuss Inner and Outer Sphere Redox Reaction mechanism with suitable examples. 10
- Q. No.3 a) Discuss the structure, specific properties and role of chlorophyll in photosynthesis. 12
b) Explain various methods for detecting and measuring radioactivity. Give its units of measurements. 13
- Q. No.4 a) How reactions occurring in molten salt systems can be studied? Explain with examples. 15
b) What are the different types of projectiles used to initiate nuclear reaction? Explain with examples. 10
- Q. No.5 a) Describe chemistry of Perovskites. Give their applications 15
b) Classify the metal complexes into inert and labile type in terms of electronic configuration and size to charge ratio of metal ion involved? 10
- Q. No.6 a) Explain Insertion-Deinsertion reactions giving mechanisms and suitable examples. 15
b) What are Siderophores? What are their functions in living system? 10
- Q. No.7 Write note on any TWO of the followings:
(d) Substitution Reactions mechanism of Square Planar complexes 2x
(e) Applications of organometallic compounds in industry 12.5=
(f) Hazardous effects of nonmetal oxides on environment 25



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Part-II A/2017
Examination:- M.A./M.Sc.

Roll No.

Subject: Chemistry (Old & New Course)
PAPER: II-A [Physical Chemistry (Additional)]

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

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

1. a) Derive expression for the rotational energy of diatomic molecule using quantum mechanical method. (15)
b) What are the wavelength ranges of (i) Cosmic rays (ii) IR radiations (iii) X-Rays. Express answer in nm and cm (06)
c) Radio-waves have much higher energy as compared to the X-rays. Comment on this statement (04)
2. a) Calculate the energy associated with (a) one photon (b) one Einstein of radiation of wavelength 8000 Angstroms (Planck's constant $h = 6.62 \times 10^{-27}$ erg sec, $c = 3 \times 10^{10}$ cm/s) (15)
b) Write a note on photosensitized reaction. (10)
3. Explain the following thermodynamics functions for ideal solutions with support of Mathematical equations / derivations (where required) (25)
a) Chemical Potential b) Gibbs free energy change for mixing c) volume change of mixing
d) enthalpy change of mixing
4. a) What are chain transfer agents in Polymers? (5)
b) What is polymerization, give different methods of preparation briefly. (8)
c) Discuss the kinetics of the free radical polymerization. (12)
5. a) What is principle of electronic transitions? Give different types of electronic transitions (12)
b) What is Raman spectroscopy? Discuss pure Raman spectra of linear molecules. (13)
6. a) Write a note on applications of IR spectroscopy. (13)
b) What is nature of light radiations? Classify different types of spectroscopy on the basis of spectral region. (12)
7. Write notes on TWO of the followings: (12.5 +12.5)
a) Separation of solid solutions
b) Kinetic of co-polymerization, c) Chemiluminescence



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Examination:- M.A./M.Sc.

Roll No.

Subject: Chemistry [Special Written] (Old & New Course)
PAPER: I-D (Bio-Chemistry)

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

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

- Q.1. Explain the term the oxidative phosphorylation. Discuss electron transport chain in detail and mention the steps involved in the formation of ATP formation. (20)
- Q.2 (a) Write down the biosynthesis of Palmitic acid (15)
(b) Elaborate the importance of cholesterol. (05)
- Q.3. Give in detail the hexose monophosphate shunt. What is the significance of this pathway and where does it takes place in the living organism. (20)
- Q.4 (a) Which kind of hormones are secreted by posterior lobe of pituitary gland. Describe the chemistry and function of oxytocin. (10)
(b) Discuss the general mechanism of action of hormones. (10)
- Q.5 (a) How purines and pyrimidine are degraded in the cell? Describe the disorder related to their metabolism. (15)
(b) How messenger RNA is produced and spliced in the cell. (05)
- Q.6 What is urea cycle? How urea is produced in the body and explain how it is linked with TCA cycle. (20)
- Q.7 (a) Explain the biosynthetic pathway of glycine. (10)
(b) Discuss the production and mechanism of action of steroid hormones in human body. (10)
- Q.8 (a) Explain β - oxidation of fatty acids in detail. (10)
(b) Discuss the regulation of carbohydrates metabolism. (10)
- Q.9 Write a note on any two of the following (10+10)
- a- Ketone bodies
 - b- Glucogenesis
 - c- Prostaglandins



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Part-II A/2017
Examination:- M.A./M.Sc.

Roll No.

Subject: Chemistry (Old & New Course)
PAPER: IV (Comp.) [Environmental Chemistry]

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

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

- Q.1 (a) How the concept of GREEN CHEMISTRY helps to protect our environment? (13)
(b) What are POINT and NON-POINT sources of pollution? (5)
(c) How NITROGEN is exchanged within the environment? (7)
- Q.2 (a) Explain how TEMPERATURE VARIATION occurs in atmosphere? (8)
(b) Why air is important of the WATER and CARBON cycle? (8)
(c) How RADON, CO and VOC's affect indoor air quality? (9)
- Q.3 (a) What is EUTROPHICATION? How it relates with use of fertilizers? (7)
(b) Discuss the ACTIVATED SLUDGE PROCESS for sewage treatment (10)
(c) Give the NEQS for Drinking water. (8)
- Q.4 (a) Discuss METHANE and NITROUS OXIDE as green house gases. (8)
(b) Briefly describe LEAD and ARSENIC poisoning. (10)
(c) What is BIOACCUMULATION & BIOAMPLIFICATION? (7)
- Q.5 (a) How pH of soil relates to NUTRIENT AVAILABILITY? (5)
(b) How MINING activities contributes soil pollution? (8)
(c) What is SOIL EROSION? Give its causes and environmental impact. (12)
- Q.6 (a) Discuss the application of GC and HPLC in Environmental monitoring? (10)
(b) Give the basic principles of UV/VIS spectrophotometer & ION SELECTIVE ELECTRODE. (10)
(c) Give the Significance of ENVIRONMENTAL MONITORING. (5)
- Q.7 Write a note on any THREE of the following (8,8,9)
(i) Eutrophication
(ii) Renewable energy; Environmental Consequences
(iii) Acid Rain
(iv) Ozone cycle
(v) Aerosols



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Subject: Chemistry (Old & New Course) [Special Written]
PAPER: I-F (Applied Chemistry)

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

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

Q. 01	a. a. How different fractions of petroleum products are obtained from crude oil. Write down in detail with the help of a labelled flow sheet diagram. Also write down what type of products can be obtained from the nonvolatile remaining portion of the crude oil.	13
	b. Explain the preparation and industrial application of xylene and propylene.	12
Q. 02	b. Explain different methods used for the analysis of fats and oils.	15
	c. How refining and hydrogenation of vegetable oils can be carried out.	10
Q. 03	c. Explain KRAFT process of pulp manufacturing with the help of flow sheet diagram and describe how it differ from other paper manufacturing processes.	15
	b. How pulp is prepared from bagass and bamboo?	10
Q. 04	c. Explain industrial preparation of epoxy resin and polystyrene	13
	d. Explain the processes of extrusion and injection moulding	12
Q. 05	a. Explain urea manufacturing process with the help of labelled 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. What are the different environmental issues generated by a leather industry. What considerations should be made for the erection of a new tannery to minimize these environmental issues?	10
	b. Explain the manufacturing and uses of potash fertilizers.	15
Q. 07	Write short note on the following.	
	a. Bleaching of pulp	05
	b. Reforming of petroleum	05
	c. Difference between fats, oils and waxes	05
	d. Industrial application of oil in resin	05
e. Halogenations and nitration of benzene	05	