UNIVERSITY OF THE PUNJAB

Part-II : Supplementary Examination 2018

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

Roll No. .....

Subject: Chemistry

PAPER: I-C: Organic Chemistry (Special)

MAX. TIME: 3 Hrs.

MAX. MARKS: 100

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

Q.1	Write down the answers for the following: a) What is the difference between Gatterman and Gatterman-Koch formylations? Indicate their limitations. b) What major products would you expect from the reactions of *N*,*N*-Diethylaniline and 4-chloro-*t*-butylbenzene with HNO_3 / H_2SO_4? Justify your answer. c) What is Frontier Molecular Orbital Approach? Explain with suitable examples. d) What you know about anchimeric assistance? Illustrate with examples.	4 × 5
Q.2	How would you carry out the following conversions using organophosphorus reagents? Write down the reaction mechanisms. a) 2-Nitrobiphenyl to 9H-Carbazole b) Cyclohexanone to Cyclohexanecarbaldehyde c) *R*-2-Butanol to *S*-2-Bentanol. d) *cis*-Cyclooctene to *trans*-Cyclooctene	4 × 5
Q.3	Design suitable syntheses for the following compounds. a) 2,4-Dimethyl-1H-pyrrole b) Ethyl 2,5-furan-3-carboxylate c) 3-Chloropyridine d) 2,4,5-Trimethylpyridine. e) Dehydroacetic acid f) Barbituric acid g) 1,2,3-Triazine h) 2,5-Dimethylthiazole	8 × 2.5
Q.4	a) Describe the protection of hydroxyl group under different reaction conditions. b) Write a note on the Schmidt Rearrangement. c) Explain how crown ethers act as phase transfer catalysts.	08 08 04
Q.5	a) Cite evidences in favour of benzyne reactive intermediate. b) Discuss the electronic structure of singlet and triplet nitrenes. Which form will be more stable in the following nitrenes. Justify your answer. i) Methylnitrene ii) Aminonitrene c) What products would you expect from the reactions ofethoxycarbonylnitrene (singlet or triplet) with benzonitrile and *cis*-but-2-ene. d) Adnan treated chlorobenzene with potassium amide in the presence of phenyl azide and bezonitrile*N*-oxide separately. What would be the expected products?	06 06 04 04

P.T.O.

Q.6	a) Explain the thermal and photochemical [1,5] sigmatropic migrations of carbon using FMO theory. b) Give your comments on the following statements about Diels- alder reaction. i) An electro withdrawing group increases the reactivity of a dienophile. ii) An electron releasing group at dienefavours the reaction. iii) The reaction is stereospecific. c) What are Cheletropic reactions? Illustrate the differences between Linear and Non-linear Cheletropic reactions.	10 06 04
Q.7	Discuss the differences and similarities in the following reactions: a) Horner-Wadsworth-Emmons reaction b) Wittig reaction c) Peterson reaction	07 + 07 + 06
Q.8	a) Discuss different methods for the formylation of aromatic substrates. b) How would you prepare the following compounds starting from naphthalene? Show all the steps. i) Naphthalen-2-amine ii) 2-Naphthoic acid iii) Phenanthrene iv) 1-Naphthol	10 4 × 2.5
Q.9	a) Draw the complete mechanism of Dakin reaction and explain the effect of pH and relative position of hydroxyl and carbonyl groups on the ring. b) How will you bring about the following conversion? Draw complete mechanisms. i) Propanoyl chloride → Butanoic acid ii) Cyclohexanone→ Caprolactam	10 2 × 5

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Subject: Chemistry **MAX. TIME: 3 Hrs.**

PAPER: I-E: Analytical Chemistry (Special) **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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Subject: Chemistry **MAX. TIME: 3 Hrs.**

PAPER: I-F: Applied Chemistry (Special) **MAX. MARKS: 100**

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

Q. 01	a. Briefly describe the various unit processes involved in petroleum processing. b. Describe the industrial production of ammonia with the help of a flow sheet diagram	13 12
Q. 02	a. Explain theory of leather tanning. b. Describe the different steps involved in the conversion of hides into leather.	10 15
Q. 03	a. How oxidation and nitration of benzene and xylene can be carried out. Also give their industrial significance. b. Write down complete process of conversion of vegetable oil in to vegetable Ghee. Support your answer with diagram and chemical reactions where required.	12 13
Q. 04	a. What are different sources of the raw materials for paper manufacturing? Write down in detail. b. Explain the different methods of preparing pulp from wood	12 13
Q. 05	Write down a comprehensive review on the importance of different fertilizers in plant growth. Also write down complete synthesis process of Urea along with the synthesis of its precursors from the available natural sources. Explain with the help of complete flow labeled flow sheet diagram.	25
Q. 06	a. On which basis polymers can be classified .Give example of each class. b. What is addition polymerization Explain is various types, giving mechanism in each case	12 13
Q. 07	Write short note on the following. a. Condensation polymerization b. Interesterification c. Lubricants and paints d. Urea assimilation in soil e. Rancidity	 05 05 05 05 05

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Subject: Chemistry **MAX. TIME: 3 Hrs.**

PAPER: II-B [Inorganic Chemistry (Additional)] **MAX. MARKS: 100**

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

Q. No.1 a) Explain insertion and deinsertion reactions giving suitable examples. **13**

b) How solvents can be classified? Describe general types of chemical reactions occurring in different solvents. **12**

Q. No.2 a) Describe the chemistry of Cobaltocene and chromocene. **18**

b) What are the benefits of Trans effect concept in chemical synthesis? **07**

Q. No.3 a) Describe the chemistry of metals in liquid NH_3 and molten salts. **15**

b) Give biochemistry of cis-platin? **10**

Q. No.4 a) Discuss the characteristics and types of metalloporphyrin rings in living organisms. **12**

b) How reactions occurring in molten salts can be monitored? What the examples of molten salts that can be used at room temperature? **13**

Q. No.5 a) Explain the Hydroformylation reactions and suitable examples. **12**

b) Discuss the mechanism of redox reactions giving suitable examples. **13**

Q. No.6 a) How nitrogen fixation occurred in vivo and in vitro? **12**

b) Explain SN_1CB mechanism of substitution reaction in octahedral complexes? **10**

c) What are the precautionary measures to use liq. HF as solvent? **3**

Q. No.7 Write note on any **TWO** of the followings: **2x 12.5=25**

i) Reductive elimination reactions

ii) Magnetic Properties of Mixed metal oxides

iii) Application of Radioactivity in Medicine, Industry and Research

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Subject: Chemistry **MAX. TIME: 3 Hrs.**

PAPER: II-E [Analytical Chemistry (Additional)] **MAX. MARKS: 100**

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

Q.1a) What kinds of transitions take place when electromagnetic radiations interact with molecules? (7)

b) Explain Beer Lambert law as a Limiting Law?. (8)

c) Describe different types of Wavelength selectors and Detectors used in UV/Vis spectrophotometers. (10)

Q.2a) What is the selection rule for IR and Raman spectra? Give a comparison of IR and Raman Spectroscopy? (10)

b) Discuss briefly the principle and working of a "Fourier Transform IR spectrometer" with the help of a schematic diagram. (8)

c) What is the criterion of absorption in the IR Region? Which of the following molecules do not absorb in IR region. H_2, HCl, ICl, O_2, N_2, H_2O, CO_2 (7)

Q.3a) Discuss the principle of Atomic Fluorescence spectroscopy? (08)

b) Describe instrumentation of Atomic Fluorescence. (09)

c) Explain the various factors affecting the phenomenon of fluorescence. (08)

Q.4a) What is the basic principle of Mass Spectrometry? (07)

b) What are different magnetic analysers used in Mass Spectrometry? Describe their functions also. (10)

c) How the mass spectrum can be interpreted? Explain with example. (08)

Q.5a) What is the basic principle of NMR? How the NMR spectrum can be elucidated by the phenomenon of chemical shift? (10

b) What is spin-spin coupling? Discuss NMR spectrum of CH_3CH_2OH, $CHCl_2CH_2Cl$. (07)

c) Briefly discuss the factors affecting on chemical shift. (08)

Q.6 a) Discuss the principle of Laser operation. (08)

b) Give the properties of Laser light. Also discuss its applications. (08)

c) Describe the production and significance of DYE lasers. (09)

Q.7 Write down notes on any **THREE** of the following. (8,8,9)

1) Ruby Laser
2) Electron Impact ionization
3) Use of TMS as standard
4) Sources of UV/Vis spectroscopy.
5) Plasma Sources in ICPES

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Part-II : Supplementary Examination 2018

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

Roll No. .....

Subject: Chemistry **MAX. TIME: 3 Hrs.**

PAPER: IV (Environmental Chemistry) **MAX. MARKS: 100**

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

Q. 1	(a)	Give the Significance of ENVIRONMENTAL EDUCATION	(6)
	(b)	Give the classification of ENVIRONMENT in detail.	(12)
	(c)	How GREEN CHEMISTRY helps to protect our environment?	(7)
Q.2	(a)	How OZONE is formed and it depletes? Distinguish between GOOD and BAD ozone.	(10)
	(b)	At what point in the smog-producing chain reaction is PAN formed.	(05)
	(c)	Write a detailed note on STRATIFICATION of the atmosphere.	(10)
Q.3	(a)	Both activated-sludge waste treatment and natural processes in streams and bodies of water remove degradable material by biodegradation. Explain why ACTIVATED SLUDGE TREATMENT is so much more effective?	(10)
	(b)	Explain the SECONDARY TREATMET processes of sewage water treatment.	(8)
	(c)	What is COD? How it can be measured?	(7)
Q.4	(a)	What environmental consequences are related to INDOOR POLLUTANTS?	(12)
	(b)	What do you mean by CHEMICAL SPECIATION?	(5)
	(c)	How PESTICIDES contribute environmental degradation?	(8)
Q.5	(a)	What are AGROCHEMICALS? How they contribute land pollution?	(7)
	(b)	What is CATION EXCHANGE CAPACITY of soils?	(6)
	(c)	How the SODIC and SALINE-SODIC soils are reclaimed?	(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 ELETRODE.	(10)
	(c)	Give the Significance of ENVIRONEMTNAL 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	