

M.Sc. DEGREE EXAMINATION (Model Question Paper)
M.Sc. (Final) Chemistry - Third semester
Specialization – ANALYTICAL CHEMISTRY
Paper I – **SEPERATION METHODS – I**

Time: Three Hours

Maximum: 80 marks

SECTION - A

Answer All Questions

(4 x 5 = 20 marks)

1. (a) Give a brief note on elution development, gradient elution development, displacement development and frontal analysis.
Or
(b) What is theoretical plate theory of chromatography?
2. (a) Write explanatory note on adsorption chromatography.
Or
(b) What is the principle of gel permeation and ion exchange chromatography? Give some examples of cation and anion exchangers.
3. (a) Write about Electron Capture Detector (ECD).
Or
(b) Give the operation and advantages of GC-MS.
4. (a) Why liquid chromatography is a good technique for the separation of protein and nucleosides?
Or
(b) Discuss the applications of LC-MS in analysis of drug and environmental samples.

SECTOIN - B

Answer All Questions

(4 X 15 = 60 marks)

5. (a) Write brief notes on :
 - i. Partition chromatography
 - ii. Retardation factor
 - iii. Retention time
 - iv. Retention volume and
 - v. Column capacity.
- (b) Discuss the following:
 - i. Zone spreading
 - ii. HETP
 - iii. Van Deemter Equation

Or

6. (a) Write short notes on the following topics in adsorption chromatography:
- i. Important requirements of a satisfactory adsorbent
 - ii. Considerations while choosing a solvent in adsorption column
 - iii. Factors effecting the column efficiency
 - iv. Applications

Or

- (b) What is capillary electrophoresis? Give the details of the instrument and its applications to organic compounds.

7. (a) What is gas chromatography? Illustrate a gas chromatographic instrument and describe components. What are the important advantages of gas chromatography?

Or

- (b) Discuss the principles and applications of counter current chromatography and affinity chromatography.

8. (a) Discuss in detail the principle, instrumentation, advantages and applications of HPLC.

Or

- (b) Explain clearly
- i. Exclusion chromatography
 - ii. Molecular sieve chromatography

DEPARTMENT OF INORGANIC AND ANALYTICAL CHEMISTRY
M.Sc. DEGREE EXAMINATION (Model Question Paper)
M.Sc. (Final) Chemistry - 3rd semester
Specialization – ANALYTICAL CHEMISTRY
Paper II –QUALITY CONTROL AND TRADITIONAL METHODS OF ANALYSIS– I

Time: Three Hours

Maximum: 80 marks

SECTION - A

Answer ALL Questions

(4 x 5 = 20 marks)

1. (a) Discuss the Q-test for rejection of data.
Or
(b) What is the importance of ICH guidelines for analysis of drug substance?
2. (a) What is sintering process and how is it different from fusion?
Or
(b) What is the use of recrystallisation and give the procedure for selection of solvent for recrystallisation.
3. (a) Give examples for primary standard and secondary standard oxidizing agents, and explain the procedure for standardization of one of the secondary standard oxidizing agent.
Or
(b) What are the requirements for the selection of oxidants?
4. (a) Give the classification of functional groups with suitable examples.
Or
(b) What is the Iodine value and give its significance?

SECTION - B

Answer ALL Questions

(4 X 15= 60 marks)

5. (a) Write short notes on :
 - i. Some of the Good Laboratory Practices (GLP) and
 - ii. GLP status in India.Or
(b) Explain the classification of errors and propagation of errors.
6. (a) Discuss the principle involved in the decomposition of samples by alkali, acid, oxidation and reductive fusions, and give two examples for each of them.
Or
(b) Explain the decomposition of samples by sintering with sodium peroxide and sodium carbonate.

7. (a) Bring out the differences between formal, standard and normal potentials of oxidants in various media.

Or

(b) Discuss the preparation, properties, standardization, stability and applications of iodate and periodate solutions.

8. (a) Explain the principle, procedure and formulae involved in the estimation of organic compounds with hydroxyl groups like thiol and phenol.

Or

(b) How do you determine the organic compounds with the following functional groups?

i. Primary amines

ii. Nitro

iii. Methoxy.

M.Sc. DEGREE EXAMINATION (Model Question Paper)
M.Sc.(Final) Chemistry - Third semester
Specialization – ANALYTICAL CHEMISTRY
Paper III –APPLIED ANALYSIS– I

Time: Three Hours

Maximum: 80 marks

SECTION - A

Answer ALL Questions

(4 x 5 = 20 marks)

1. (a) What are the general methods of dissolution of complex materials?
Or
(b) Give the general procedures for the determination of moisture and loss of ignition of a sample.
2. (a) What are the main constituents of blast furnace ore?
Or
(b) How calcium in limestone can be estimated?
3. (a) What is the composition of cement?
Or
(b) What is saponification number of oil and give its significance.
4. (a) Define BOD and COD. Always COD is greater than BOD. why?
Or
(b) Give the ill effects of different water pollutants.

SECTION - B

Answer All Questions

(4 X 15 = 60 marks)

5. (a) Give the procedures for estimations of total iron, alumina and estimated present in iron ore?
Or
(b) Explain the analysis of
 - i. Chromium in chromite ore
 - ii. Alumina in bauxite and
 - iii. Manganese in manganese ore.
6. (a) Describe the analysis of carbon, manganese and chromium in the steel sample
Or
(b) Give the procedure for the analysis of different constituents of flour spar.

7. (a) Discuss the complete analysis of cement.

Or

(b) Give the procedures for the estimation of following in a soap :

- i. Total alkali
- ii. Total fatty matter
- iii. Free caustic alkali
- iv. Sodium silicate

8. (a) Give the principle, importance of each reagent used in the estimation of dissolved oxygen of a water sample. Explain the detailed procedure for estimation.

Or

(b) Explain the principle and procedure for the analysis of the following ions present in a water sample:

- i. Nitrite
- ii. Cyanide
- iii. As^{5+}
- iv. Co^{+2}

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M.Sc. DEGREE EXAMINATION (Model Question Paper)
M.Sc.(Final) Chemistry - 3rd semester
Specialization – ANALYTICAL CHEMISTRY
Paper IV –INSTRUMENTAL METHODS OF ANALYSIS - I

Time: Three Hours

Maximum: 80 marks

SECTION - A

Answer ALL Questions

(4 x 5 = 20 marks)

1. (a) What is Beer's Law and give the reasons for positive and negative deviations?
Or
(b) What are the factors effecting fluorescence and phosphorescence?
2. (a) Discuss various type of molecular vibrations.
Or
(b) What is Raman Effect and given the conditions for a molecule to be Raman active.
3. (a) Bring out the use of shift reagent in NMR spectroscopy.
Or
(b) Write a short note on 'g' Value.
4. (a) What is nitrogen rule and how it is useful to have an idea about the mass of the given organic molecule?
Or
(b) Write about matrix effect.

SECTION - B

Answer ALL Questions

(4 x 15 = 60 marks)

5. (a) What are spectrometric titrations? Explain (i) procedure involved in spectrophotometric titrations and (ii) Advantages of these titrations.
Or
(b) How thiamin and riboflavin in drug samples are determined using spectrophotometry?
6. (a) Explain the functions of various components in IR spectrophotometer with the help of a neat sketch of IR spectrophotometer.

Or

- (b) Differentiate Raman and IR Spectra and explain how Raman spectroscopy is useful for structural elucidation of CO, CO₂, H₂O, N₂O.
7. (a) Discuss the applications of chemical shift, intensity of peaks and spin-spin splitting in the interpretation of NMR spectra with one example.

Or

- (b) Draw a neat sketch of ESR Spectrometer and explain each component in it.
8. (a) Write short note on:
- (i) Resolution in a mass spectrometry.
 - (ii) Molecular ion.
 - (iii) Meta stable ions.

Or

- (b) Discuss in detail about the instrumentation in X-ray spectroscopy.

M.Sc. DEGREE EXAMINATION (Model Question Paper)
M.Sc.(Final) Chemistry - Fourth semester
Specialization – ANALYTICAL CHEMISTRY
Paper I –SEPARATION METHODS -II

Time: Three Hours

Maximum: 80 marks

SECTION - A

Answer ALL Questions

(4 x 5 = 20 marks)

1. (a) What is the principle involved in paper chromatography?
Or
(b) Write the different visualization methods in TLC.
2. (a) Give the principles of separation in ion chromatography.
Or
(b) Write a brief note on applications of ion exchangers in different fields.
3. (a) Differentiate the stratified and random sampling.
Or
(b) Discuss the basis and purpose of sampling.
4. (a) Give the importance of qualitative analysis in R&D and industries.
Or
(b) What are crown ethers and explain their use in solvent extraction?

SECTION -B-

Answer ALL Questions

(4 X 15 = 60 marks)

5. (a) Discuss the principle, instrumentation and applications of HPTLC.
Or
(b) Explain the following development methods in paper chromatography: ascending, descending, horizontal, circular spreading and multiple developments.
6. (a) Explain the principle and equipment in ion exchange chromatography. Discuss its application in the separation of amino acids.
Or
(b) Explain the following: anion and cation exchange resins, ion-exchange Mechanism, ion exchange capacity and regeneration of ion exchange resins.
7. (a) Discuss in detail about sampling of different types of liquids and preservation of
of
Collected liquid samples.
Or
(b) Explain different methods for instantaneous monitoring of gases.
8. (a) Give the principles and processes of solvent extraction and show that multiple extraction is better than a single extraction.
Or
(b) Write short notes on batch extraction, continuous extraction and counter current extraction.

M.Sc. DEGREE EXAMINATION (Model Question Paper)
M.Sc.(Final) Chemistry - Fourth semester
Specialization – ANALYTICAL CHEMISTRY
Paper II – TRADITIONAL METHODS OF ANALYSIS-II

Time: Three Hours

Maximum: 80 marks

SECTION - A

Answer ALL Questions

(4 x 5 = 20 marks)

- (a) Compare the contrast the co-precipitation and post- precipitation.
Or
(b) Give the principle, p^H conditions and indicator used in Mohr's method for the determination of chlorides.
- (a) Explain the preparation, stability, advantages and disadvantage of sodium tetra phenyl boron solution.
Or
(b) What is decomposition potential and give its importance.
- (a) What is the general procedure for the selection of a suitable indicator in red-ox titrations.
Or
(b) Differentiate the formal, standard and normal potentials.
- (a) What are antimicrobial agents?
Or
(b) Discuss about ant amoebic agents.

SECTOIN - B

Answer ALL Questions

(4 X 15 = 60 marks)

- (a) Give the principle in precipitation titrations and discuss the various types of indicators used in precipitation titrations.
Or
(b) Discuss in detail about the crystal growth.
 - (a) Discuss in detail about theory, various methods and advantage of PFHS.
Or
(b) Explain the electrolysis at constant electrolysis method and its application in the analysis of brass.
 - (a) Discuss the preparation, stability, standardization and applications of reductive systems V(II), Ti(III) and ascorbic acid.
Or
(b) Discuss the preparation, stability, standardization and applications of reductive systems Cr (II), Sn (II) and hydroquinone.
 - (a) What are sulpha drugs and give the procedure for the estimation of the sulfadiazine.
Or
(b) Discuss about antimicrobacterial agents and anti hypertensive agents. How is metronidazole estimated in the given sample?
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M.Sc. DEGREE EXAMINATION (Model Question Paper)
M.Sc.(Final) Chemistry - Fourth semester
Specialization – ANALYTICAL CHEMISTRY
Paper III –APPLIED ANALYSIS

Time: Three Hours

Maximum: 80 marks

SECTION - A

Answer ALL Questions

(4 x 5 = 20 marks)

1. (a) Give the principle involved in the estimation of silicon present in ferro alloys.
Or
(b) Give the compositions of brass and ferro chromium.
2. (a) Explain sampling of soil and methods of its preservation.
Or
(b) What is UHV? Discuss the grading of coal based on UHV.
3. (a) Give the composition of pure air.
Or
(b) Give the sources and effects of SO₂ & H₂S.
4. (a) Give the classification of solvents.
Or
(b) What is the principle involved in determination of weak acid using non aqueous titrimetry?

SECTION - B

Answer ALL Questions

(4 X 15= 60 Marks)

- 5.(a) Give the constituents of ferro vanadium and explain the procedure for the determination of any three constituents.
Or
(b) Explain the analysis of brass.
 6. (a) What is proximate analysis and how is it carried out? Give the significance of each parameter determined.
Or
(b) Give the procedure of the analysis of phosphate fertilizers.
 7. (a) Explain the classification of air pollutants and methods of collection of air samples.
Or
(b) Discuss the sources, effects and control of CO₂, N₂O, aliphatic hydrocarbons and respirable particulate matter.
 8. (a) Discuss the determination of moisture content in drugs using Karl-Fisher reagent.
Or
(b) How the toxic metals are determined using kinetic reactions.
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DEPARTMENT OF INORGANIC AND ANALYTICAL CHEMISTRY

M.Sc. DEGREE EXAMINATION (Model Question Paper)

M.Sc.(Final) Chemistry - 4th semester

Specialization – **ANALYTICAL CHEMISTRY**

Paper IV –**INSTRUMENTAL METHODS OF ANALYSIS -II**

Time: Three Hours

Maximum: 80 marks

SECTION - A

Answer ALL Questions

(4 x 5 = 20 marks)

- (a) Give the construction of Halo cathode lamp and explain its working.
Or
(b) Write a short note on AES detectors.
- (a) What are the factors effecting TG curves?
Or
(b) How DSC is useful for the analysis of drugs?
- (a) What are the advantages in DME in Polarography?
Or
(b) Give the principle involved in Coulometric analysis.
- (a) Write about calomel electrode and how it is advantageous over hydrogen electrodes?
Or
(b) Give various techniques for measurement of radioactivity.

SECTION - B

Answer All Questions

(4 X 15 = 60 marks)

- (a) Explain the theory and applications of flame photometry in analysis of Alkali and alkali-earth metals.
Or
(b) Explain the different types of interferences involved in AAS and give methods to avoid them.
- (a) Give principle and instrumentation of DTA.
Or
(b) Discuss the principle and application of thermo gravimetry for the analysis of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, $\text{CaC}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$.
- (a) Explain: (i) Half-wave potential and (ii) Ilkovic equation.
Give their applications in simultaneous analysis.
Or
(b) Discuss the principle and application of anode stripping voltammetry in the analysis of heavy metals in environmental samples.
- (a) Discuss the theory of membrane potentials and liquid junction potentials.
Or
(b) Give a brief note on (i) Radioactive tracers and applications of tracer technique.
(ii) Isotopic dilution analysis.
