

Master of Science in Analytical Chemistry

Examination April - 2026

Day & Date	Semester	Subject Name	Time	Code	Marks
Thursday 23/04/2026	II	Analytical Chemistry Paper II	11.00 am to 01.00 pm	215211	50

INSTRUCTION: All Question Are Compulsory
Draw Neat Labelled Diagram

Q. 1 Attempt any Five of the following (10)

1. Define infrared spectroscopy?
2. Define atomization in AAS.
3. What is chemiluminescence?
4. Mention two types of electrodes used in potentiometry.
5. State the Nernst equation.
6. What is the dropping mercury electrode (DME)?
7. What is controlled potential coulometry?

Q.2 Attempt any two of the following (10)

1. Explain the principle, instrumentation, and advantages of dual wavelength spectroscopy.
2. Discuss the process of atomization in AAS.
3. Compare AAS and IR spectroscopy in terms of principle, instrumentation, and applications.

Q.3 Attempt any two of the following (10)

1. Describe the principle and instrumentation of flame emission spectroscopy (FES) with a neat diagram?
2. Describe factors affecting fluorescence and phosphorescence.
3. Explain the theory and instrumentation of AES.

Q.4 Attempt any two of the following (10)

1. Explain the theory and instrumentation of potentiometric methods?
2. Write a note on advantages and limitations of potentiometric analysis.
3. Derive the Nernst equation and explain the significance of each term in the equation. How is the Nernst equation used in potentiometric measurements?

Q.5 Attempt any two of the following (10)

1. Compare and contrast controlled potential coulometry and controlled current coulometry in terms of their principles, instrumentation, and applications?
2. Discuss the merits, demerits, and scope of polarography.
3. Explain the principle and types of stripping voltammetry with an example.?

M.SC. ANALYTICAL CHEMISTRY**Examination: November 2025**

Day & Date	Semester	Subject Name	Time	Code	Max. Marks
Tuesday 25/11/2025	II	Analytical Chemistry Paper II	02:00 pm to 04:00pm	215211	50

Instruction: All Questions are compulsory.**Draw Neat Labelled Diagram.****Q.1 Attempt any FIVE of the following. (10)**

1. State the basis principle of Infrared (IR) Spectroscopy ?
2. Name type of detector used in AAS?
3. What does FTIR stand for? How does it differ from dispersive IR spectroscopy ?
4. Name two essential components of an AES instrument ?
5. State the basis principle of chemiluminescence ?
6. What is the role of the indicator electrode in potentiometry?
7. Name the two main types of coulometric methods?

Q. 2 Attempt any TWO of the following. (10)

1. Explain the theory and principle behind infrared (IR) Spectroscopy, including the interaction of IR radiation with molecular vibrations?
2. Describe the different processes of atomization used in AAS & Discuss the different types of light sources ?
3. Discuss the application, advantages and disadvantages of Dual Wavelength Spectroscopy in spectrophotometric analysis.

Q. 3 Attempt any TWO of the following. (10)

1. Describe the principle and basic instrumentation of a Flame Emission Spectrometer?
2. Discuss the various factors that can affect the intensity of fluorescence and phosphorescence?
3. Discuss the applications, advantages and disadvantages of Atomic Emission Spectroscopy (AS) in elemental analysis ?

Q. 4 Answer Any TWO of the following. (10)

1. Describe the key components of a potentiometric cell, including the indicator electrode, reference electrode, and salt bridge. Explain the function of each component ?
2. Discuss the different types of potentiometric titrations such as acid-base redox and precipitation titrations. Explain the principles behind each type and how the endpoint is determined?
3. Derive the Nernst equation and explain the significance of each term in the equation. How is the Nernst equation used in potentiometric measurements ?

Q. 5 Answer Any TWO of the following. (10)

1. Compare and contrast controlled potential coulometry and controlled current coulometry in terms of their principles, instrumentation and applications ?
2. Describe the different types of polarography, highlighting their unique features and applications?
3. Explain the principle of stripping voltammetry. Why is it considered a highly sensitive technique ?

*** END OF PAPER ***

Master of Science in Analytical Chemistry**Examination: April 2026**

Day & Date	Semester	Subject Name	Time	Code	Max. Marks
Saturday 25/04/2026	II	Cosmetics Formulations and Quality Control	11.00 a.m. to 01.00 p.m.	215212	50

Instructions- ALL QUESTION ARE COMPULSORY**Q. A) Attempt any Five of the following (10)**

1. Define cosmetic with examples
2. Write any 4 appendage of skin
3. Write any 4 ways of packaging cosmetic products
4. Write any 4 types of light used in cosmetic industry
5. Define Microbial Limit Test (MLT).
6. Explain the function of manicure preparations
7. Describe any four surfactants used in the preparation of shampoos.

Q. B) Attempt any Two of the following (10)

1. Explain the importance of Lighting and Ventilation in cosmetic manufacturing.
2. Write a detailed note on Raw Material and Finished Product Testing under Quality Control.
3. Write a note on Location and Surroundings of a cosmetic manufacturing unit

Q. C) Attempt any Two of the following (10)

1. Explain in detail Anatomy of skin and its functions with neat labelled diagram.
2. Write a note on Packaging and it's types.
3. Explain manufacturing of Perfumes natural and synthetic type of perfumes.

Q. D) Attempt any Two of the following (10)

1. Write a detailed note on Face Powders their types, composition, functions and applications?
2. Differentiate between Synthetic, Herbal, and Baby Care Creams and Lotions based on ingredients and purpose.
3. Describe the functions and formulation of Hair Grooming Products (such as hair oil, hair cream, or gel).

Q. E) Attempt any Two of the following (10)

1. Define Microbial Limit Test (MLT) and describe the detection procedures for:
 - a. Salmonella species
 - b) Pseudomonas aeruginosa
 2. Define Skin Sensitivity Test and explain the types of sensitivity tests used in cosmetics.
 3. Explain the basic steps involved in analysing the components of cosmetic powders.
-

Master of Science in Analytical Chemistry
Examination April-2026

Day & Date	Semester	Subject Name	Time	Code	Marks
Tuesday 28/04/2026	II	Environmental Science	11.00 a.m. to 01.00 p.m.	215213	50

Instructions: All Questions Are Compulsory.

- Q.1 Attempt any FIVE of the following. (10)**
- Define pollution and mention its major types?
 - What is the composition of air?
 - Define BOD and COD?
 - Write a short note on photochemical smog?
 - What are biogeochemical cycles?
 - Define adsorption and absorption?
 - What is fly ash and how is it produced?
- Q.2 Attempt any TWO of the following. (10)**
- Explain the classification and sources of pollution?
 - Explain DO, BOD, and COD, and their significance in water pollution?
 - Describe biogeochemical cycles of carbon and nitrogen with neat diagrams?
- Q.3 Attempt any TWO of the following. (10)**
- Explain the principle and working of electrostatic precipitator and cyclonic separator?
 - Discuss methods to control water pollution primary, secondary, and advanced treatments?
 - Explain vibration measurement and noise control methods?
- Q.4 Attempt any TWO of the following. (10)**
- Explain the analysis of gases NO_2 , SO_2 , and H_2S and describe the analysis of toxic heavy metals Pb, Cu, Hg?
 - Write short notes on -hazardous waste management methods, neutralization, oxidation-reduction, and solidification?
 - Discuss e-waste classification and methods of handling and disposal?
- Q.5 Attempt any TWO of the following. (10)**
- Explain the Environmental (Protection) Act, 1986 and its rules?
 - Discuss the Coastal Regulation Zones (CRZ) 1991 and their amendments?
 - Write a note on major environmental disasters - Minamata and Love Canal?

M.SC. ANALYTICAL CHEMISTRY**Examination: November 2025**

Day & Date	Semester	Subject Name	Time	Code	Max. Marks
Saturday 29/11/2025	II	Environmental science	02:00 am to 04:00 pm	215213	50

Instruction: All Questions are compulsory.**Q.1) Attempt any FIVE of the following. (10)**

1. What are the main components in soil ?
2. What are the particles, ions, and radicals in the atmosphere with 2 examples?
3. What is the use of activated sludge ?
4. What is the aerobic and anaerobic process with 2 examples of bacteria ?
5. What are the characteristics of fly ash?
6. Write types of e-waste?
7. What is the 4R+E rule?

Q. 2) Attempt any TWO of the following. (10)

1. Explain types of pollution : soil and radioactive ?
2. Write a note with neat labeled diagram of biogeochemical cycles: nitrogen and sulfur ?
3. Explain photochemical smog with types?

Q. 3) Attempt any TWO of the following. (10)

1. Explain wastewater treatment with a neat labeled diagram?
2. Explain modified synthetic fertilizers for improving soil?
3. Explain active and passive method for control of noise pollution?

Q. 4) Answer Any TWO of the following. (10)

1. Explain fly ash : sources, composition and utilization ?
2. Explain e-waste : classification, methods of handling and disposal along with management of treatment ?
3. Explain plastic waste : sources, consequences and management ?

Q. 5) Answer Any TWO of the following. (10)

1. Explain The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules 2000?
2. Explain The Plastic Waste Management Rules 2016 ?
3. Explain Environment (Protection) Act, 1986 and Rules 1986?

***** END OF PAPER*****

Master of Science in Analytical Chemistry
Examination: April 2026

Day & Date	Semester	Subject Name	Time	Code	Max. Marks
Thursday 30/04/2026	II	Pharmaceutical Analysis	11.00 am to 1.00 pm	225211	50

Instructions: ALL QUESTION ARE COMPULSORY

Q.A) Attempt any Five of the following

10

1. Write Differentiate between tablets and capsules as dosage forms?
2. What is the significance of using matched colour standards in limit tests?
3. Explain any four factors affecting Disintegration?
4. Draw the neat level diagram of Gutzeit Apparatus
5. Define potentiometry and conductometry?
6. Define Accuracy and Precision with Example.
7. Why water is important in pharmaceutical Industry?

Q.B) Attempt any Two of the following

10

1. Write a comprehensive overview of different dosage forms. Focus on their characteristics, advantages, and quality control requirements.
2. Explain monograph with detailed reference to streptomycin sulphate?
3. Explain the importance and objectives of Pharmaceutical Analysis in the drug industry?

Q. C) Attempt any Two of the following

10

1. What is the principle of the Limit Test for Heavy Metals? Explain any one heavy metal limit tested in pharmaceuticals.
2. Why is it essential to perform both identity and purity tests on a pharmaceutical substance? Explain with examples?
3. Explain Sustain release drugs formulations with Advantages and Disadvantages?

Q.D) Attempt any Two of the following**10**

1. Describe the fundamental principles of Total Quality Management (TQM) and its application in a pharmaceutical manufacturing unit?
2. Define an Out-of-Specification (OOS) result. Outline the step-by-step laboratory investigation procedure that must be followed after its discovery?
3. What is the purpose and scope of a Validation Master Plan (VMP)? List its essential components that ensure comprehensive validation coverage for a pharmaceutical facility?

Q.E) Attempt any Two of the following**10**

1. Write detailed notes on detection methods for microorganisms “Staphylococcus aureus”.
2. Define chemotherapeutic agents. Classify them with one example each.
3. Differentiate between disintegration and dissolution. Why is dissolution testing more critical for most solid dosage forms?

**M.Sc. Analytical Chemistry
Examination December - 2025**

Day & Date	Semester	Subject Name	Time	Code	Marks
Thursday 04/12/2025	II	Pharmaceutical Analysis	02.00 p.m. To 04.00 p.m.	225211	50

NOTE- ALL QUESTION ARE COMPULSORY

Q.A) Attempt any Five of the following (10)

1. Name four major international pharmacopoeia standards other than IP?
2. Write the Eight Quality Management Principles.
3. Define sustained release formulations. Give two examples.
4. Define Enumeration testing.
5. Explain microbial limit test of E-coli bacteria.
6. What is the significance of using matched colour standards in limit tests?
7. Define Capsules, tablets, unit dosage and Powder?

Q.B) Attempt any two of the following (10)

1. Write a comprehensive overview of different dosage forms. Focus on their characteristics, advantages, and quality control requirements.
2. Explain monograph with detailed reference Streptomycin Sulphate.
3. Elaborate on the classification of analytical techniques with examples:
A) Classical methods. B) Instrumental methods.

Q.C) Attempt any Two of the following (10)

1. Write a note on sources of pharmaceutical impurities Include quality control measures for each.
2. Explain the step-by-step procedure for chloride limit in sodium benzoate?
3. Explain controlled release drug formulations in detail, including their working mechanisms, advantages, and disadvantages?

Q.D) Attempt any Two of the following (10)

1. Explain pharmaceutical deviation reporting: investigation methods and quality system impacts?
2. Describe the Total Quality Management procedure in pharmaceutical manufacturing?
3. What is Validation Master Plan and what are its essential components?

Q.E) Attempt any Two of the following (10)

1. Describe the properties of platinum-based chemotherapeutic drugs, explain their specific interactions with cellular DNA?
2. Explain the dissolution and disintegration tests for solid dosage forms.
3. Write detailed notes on detection methods for specific microorganisms.
