Rayat Shikshan Sanstha's

Annasaheb Awate Arts, Commerce and Hutatma Babu Genu Science College

Manchar, Tal. Ambegaon, Dist. Pune

DEPARTMENT OF CHEMISTRY

Course Outcomes (COs)

M.Sc. II Analytical Chemistry 2024-25

Semester-III

Sr. No.	Class	Course	Course Outcomes
1.	M.Sc. II Analytical Chemistry Semister-III (Theory)	CHA-601 MJ Thermal and Extraction Techniques in Analytical Chemistry	1. Define key terms and historical context in thermal and extraction techniques. 2. Explain the operation of thermal analysis apparatuses. 3. Apply theoretical principles to interpret thermal analysis data. Analyze applications of simultaneous thermal analysis techniques. 4. Evaluate the efficiency of analytical extraction techniques. 5. Summarize the significance and applications of thermal and 6. extraction techniques.
2.	M.Sc. II Analytical Chemistry Semister-III (Theory)	CHA-602 MJ: Advanced Chromatographic Method of Chemical Analysis	1. Define various terms in chromatography (GC and HPLC) and mass spectroscopy. 2. Know instrumentation's basic principles of chromatography (GC and HPLC) and mass spectroscopy. ii) separation in GC / HPLC column. iii) Functioning and construction of GC / HPLC/ MS detectors. 3. Apply chromatography techniques in industry and in analytical laboratory and solve numerical problems on chromatography (GC and HPLC) and mass spectroscopy. 4. Analysis the sample by utilizing the gained knowledge Advanced Chromatographic techniques. 5. Relate the different chromatographic techniques based on their significance and application. 6. 6. Collect information of advanced chromatographic techniques like GC and HPLC.
3.	M.Sc. II Analytical Chemistry Semister-III (Theory)	CHA-603 MJ: Applied Electro-analytical Techniques	1. Define various terms related to Electrochemistry. 2. Explain instrumentations and functioning of polarography, potentiometry, cyclic voltammetry, Stripping methods, and hydrodynamic voltammetry. 3. Apply the gained knowledge of polarography, potentiometry, cyclic voltammetry, Stripping methods, hydrodynamic voltammetry and solve numerical problems on electrochemistry. 4. Differentiate between polarography, potentiometry, cyclic voltammetry, Stripping methods, and

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			hydrodynamic voltammetry. 5. Explain applications polarography, potentiometry, cyclic voltammetry, Stripping methods, and hydrodynamic voltammetry Create a list of applied electro-analytical techniques, their significance and applications.
4.	M.Sc. II Analytical Chemistry Semister-III (Theory)	CHA-604 MJP: Instrumental Methods of Chemical Analysis	1. Define various terms involved in practical methods of quantitative analysis. 2. Explain the instrumentations of colorimeter, spectrophotometer, photoflurometer, TGA, HPLC, GC, Flame-photometer, CV, AAS, etc. 3. Apply/select method / instrumental parameters for analysis of the given sample. 4. Explain / describe basic principles of chromatography and different instrumental methods of analysis. Able to handle instruments according to SOP. 5. Differentiate among the various analytical methods / techniques of chemical analysis and verify theoretical principle practically or apply theory to explain practical observations. 6. Maintain a proper record of analytical data in notebook. Observer personal safety in laboratory and able handle all chemicals, instruments, etc safely in laboratory.
5.	M.Sc. II Analytical Chemistry Semister-III (Practical)	CHA-605 MJP: Analytical Method Development and Validation	1. Define / understand various chemical terms involved Method development and validation. 2. Explain statistical parameters of Method development. 3. Apply / select particular method / instrumental parameters for analysis of given sample and give mathematical treatment to analytical data and able to interpret the results accurately. 4. Analyze the results able to take the decision regarding quality of sample. 5. Maintain proper record of analytical data in notebook. Observer personal safety in laboratory and able handle all chemicals, instruments, etc safely in laboratory. 6. Design / modify and validate new analytical method for chemical analysis of particular sample.

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6.	M.Sc. II Analytical Chemistry Semister-IV (Theory)	CHA-610 (A) MJ: Analytical Methods for Examining Water and Soil	1. Define various terms used in- analysis of water and soil 2. Describe techniques / methods of water and soil analysis 3. Solve numerical problems on analysis water and soil 4. Describe sources of water pollution and pollutants. 5. Describe / explain methods / techniques of sampling of water and soil and their analysis. 6. Explain importance of water and soil analysis.
7.	M.Sc. II Analytical Chemistry Semister-IV (Theory)	CHA-611 (A) MJP: Measuring Water and Soil Quality	1. Learn various terms used in- analysis of water and soil 2. Explain techniques / methods of water and soil analysis 3. Employ the gained knowledge in determination water and soil quality. 4. Analyze the sources of water pollution and pollutants. 5. Describe techniques of sampling of water and soil and their analysis. 6. Create a report on experimental procedures, observations and results.
8	M.Sc. II Analytical Chemistry Semister-IV (Project)	CHA-631 RP: Research Project	1. Identify and select a research-based project in the field of analytical chemistry. 2. Summarize the significance of the chosen research problem, outline aims, and objectives. 3. Execute the outlined research methodology and experimental procedures. 4. Analyse existing literature related to the research problem, critically evaluating previous studies and integrating relevant findings into the review of literature section. 5. Interpret experimental results effectively, discussing findings within the context of the research objectives, and drawing meaningful conclusions in the results and discussion section. 6. Present the research project through a comprehensive report format, including proper documentation, citation, and acknowledgment, and prepare for external evaluation through a PowerPoint presentation and viva voce examination.

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M.Sc. II Analytical Chemistry 2024-25

Semester-IV

Sr. No.	Class	Course	Course Outcomes
1.	M.Sc. II Analytical Chemistry Semister-IV (Theory)	CHA-651 MJ: Applied Analytical Spectroscopy	1. Learn various terms in atomic absorption, atomic emission, fluorescence, ESR and electron spectroscopy. 2. Describe basic principles of atomic absorption, atomic emission, ICPAES, ICPAES-MS, fluorescence, ESR and electron spectroscopy. 3. Select appropriate methods for sample treatment in AAS / AES, ICPAES, ICPAES-MS. 4. Solve problems based on atomic absorption, atomic emission, ICPAES, ICPAES-MS, fluorescence, ESR and electron spectroscopy. 5. Interpret ESR spectra, super hyperfine splitting and g value in ESR, and parameters affecting it. 6. Explain the instrumentation of atomic absorption, atomic emission, ICPAES, ICPAES- MS, fluorescence, ESR and electron spectroscopy.
2.	M.Sc. II Analytical Chemistry Semister-IV (Theory)	CHA-652 MJ: Chemical Methods of Pharmaceutical Quality Control	1. Define various terms related to pharmaceutical identification, quality tests and assay. 2. Describe basic principles of assay of raw materials and finished products. 3. Solve numerical problems on analysis chemical analysis of pharmaceuticals. 4. Interpret IR, UV-Visible, GC-Chromatogram and HPLC chromatogram in pharmaceutical identification. 5. Analyze the methodology for identification, quality tests and assay of pharmaceutical raw materials and finished products. 6. Explain importance of chemical analysis in quality control of pharmaceuticals.
3.	M.Sc. II Analytical Chemistry Semister-IV (practical)	CHA-653 MJP: Pharmaceutical Analysis for Quality Control	1. Define various terms related to pharmaceutical identification, quality tests and assay. 2. To describe basic principles of assay of raw materials and finished products. 3. Employ the methodology for identification, quality tests and assay of pharmaceutical raw materials and finished products. 4. Solve numerical problems on analysis chemical analysis of pharmaceuticals. 5. Interpret IR, UV-Visible spectrum in pharmaceutical identification. 6. Explain importance of chemical analysis in quality control of pharmaceuticals.

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4.	M.Sc. II Analytical Chemistry Semister-IV (practical)	CHA-654 MJP: Methods of Food Quality Determination	1. Define various terms food analytical chemistry and food analytical techniques. 2. Describe basic principles of various methods of food analysis. 3. Apply appropriate methods for sample treatment for particular analysis of food. 4. Analyse the food. 5. Evaluate the quality of the food. 6. Prepare a laboratory report detailing experimental procedures, observations, and findings related to food quality analysis.
5.	M.Sc. II Analytical Chemistry Semister-IV (Theory)	CHA-660(A) MJ: Bio-Analytical Techniques	1. Define various terms in electrophoresis, capillary electrophoresis, ELISA. 2. Learn the basic principles paper electrophoresis, gel electrophoresis, capillary electrophoresis, and different types of ELISA 3. Apply the particular method of analysis to particular type of sample. 4. Relate the advantages and applications of paper electrophoresis, gel electrophoresis, capillary electrophoresis, and different types of ELISA. 5. Interpret experimentally obtained results of paper electrophoresis, gel electrophoresis, capillary electrophoresis, and different types of ELISA. 6. Explain instrumentation paper electrophoresis, gel electrophoresis, capillary electrophoresis, and different types of ELISA.
6.	M.Sc. II Analytical Chemistry Semister-IV (Theory)	CHA-660(C) MJ: Analytical Techniques of Polymers Characterization	1. Learn various terms in polymer analysis. 2. Understand the basic principles techniques / methods polymer analysis. 3. Categorize the different techniques / methods of polymer analysis. 4. Analyse the polymer based on their properties, contents and applications. 5. Assess the quality of polymer 6. Describe results of analysis polymer.
7.	M.Sc. II Analytical Chemistry Semister-IV (Theory)	CHA-681 RP: Research Project	1. Identify and select a research-based project in the field of analytical chemistry. Summarize the significance of then research problem, outline aims, and objectives. 2. Execute the outlined research methodology and experimental procedures. 3. Analyse existing literature related to the research problem, critically evaluating previous studies and integrating relevant findings into the review of literature section. 4. Interpret experimental results effectively, discussing findings within the context of the research objectives, and drawing meaningful conclusions in the results and discussion section. Present the research project through a comprehensive report format, including proper documentation, citation, and acknowledgment, and prepare

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			for external evaluation through a PowerPoint presentation and viva voce examination.