CSIR-CENTRE FOR CELLULAR AND MOLECULAR BIOLOGY
(Council of Scientific and Industrial Research)
Uppal Road, Habsiguda, Hyderabad - 500 007, Telangana.
Website: https://www.ccmb.res.in

No. CCMB/Rect./Advt. No. 01/2021/T 02 Dated: 09.01.2026

NOTICE

Sub.: Schedule of Trade Test and Competitive Written Examination for the posts of Gr. II (1)/Technician (1), Post Code: T 02 – reg.

Ref.: 1. CSIR-CCMB Advt. No. 01/2021
2. CSIR-CCMB Notice dated: 20.06.2023

It is to inform to all the candidates who have been shortlisted for the advertised posts of Gr. II (1)/Technician (1), Post Code: **T 02** vide CSIR-CCMB, Advt. No. 01/2021, that the detailed schedule of the Trade Test is given below:

Trade Test Schedule:

Post Code	**T 02**
Date of Trade Test	**30.01.2026 (Friday)**
Timing	**09:30 AM to 05:30 PM**
Reporting Time	**08:00 AM** **(Candidates shall not be allowed after 09:00 AM)**
Venue	**CSIR-Centre for Cellular & Molecular Biology, Uppal Road, Habsiguda, Hyderabad, Telangana-500007**

The detailed instructions are available on the Admit card, which may be downloaded from the below link for Trade Test w.e.f. 20.01.2026 after 04:00 PM https://recruitment-staff.ccmb.res.in/Advt_01_2021_Gr2/

Only the candidates who qualify in the Trade Test will be allowed to appear for Competitive Written Examination.

Competitive Written Examination Schedule:

Post Code	**T 02**
Date of Examination	**Tentatively in the 2nd week of February, 2026**
Location	**Hyderabad**

Exact date, time and venue of the Competitive Written Examination will be available on the Admit Cards only after completion of Trade Test.

The Syllabus for the Trade Test and Concerned Subject in Competitive Written Examination for the aforementioned postcode is enclosed as Annexure I.

The candidates are requested to visit CSIR-CCMB website **https://www.ccmb.res.in** regularly for recruitment updates.

For any queries regarding downloading of Admit cards may be e-mailed to **recruitment.ccmb@csir.res.in** on or before 28.01.2026.

Sd/-

Dated: 09.01.2026 **Sr. Controller of Administration**

Annexure-I

Syllabus for the

Trade Test

&

Competitive Written Examination

Post Code: T 02

5. LEARNING OUTCOME

Learning outcomes are a reflection of total competencies of a trainee and assessment will be carried out as per the assessment criteria.

5.1 LEARNING OUTCOMES

FIRST YEAR

1. Identify common chemical reagents and prepare various types of solutions following safety precautions.(NOS:MIN/N9417)
2. Plan and estimate the strength of unknown acid, bases and other reagents by redox & iodimetric titration and prepare indicators and results of titration. (NOS:MIN/N9418)
3. Execute precipitation and complex metric titration to determine the strength of unknown reagents and record the data. (NOS:MIN/N9419)
4. Verify the physical/ thermal properties and record the analysis. (NOS:MIN/N9420)
5. Identify and test various electrical components like switches, fuses, conductors etc. (NOS:MIN/N3103)
6. Identify, test various electronic components using proper measuring instruments and apply this knowledge to troubleshoot power supplies. (NOS:MIN/N3104,MIN/N3105)
7. Verify the Electro-chemical properties of electrolytes. (NOS:MIN/N9421)
8. Execute quantitative analysis of metal and non-metal by Gravimetric estimations, perform stoichiometry calculations and record the results. (NOS:MIN/N9422)
9. Perform detection of inorganic substances by qualitative analysis, by dry tests, wet tests and record the procedures. (NOS:MIN/N9423)
10. Assemble, Test, calibrate and troubleshoot the pressure, temperature, recording instrument and controlling instruments. (NOS:MIN/N9424)
11. Read and apply engineering drawing for different application in the field of work. (NOS:MIN/N9402)
12. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS:MIN/N9401)

SECOND YEAR

13. Plan and organize the technique (with different unit process and unit operation) of organic compounds. (NOS:MIN/N9425)
14. Plan and organize technique of inorganic substance with quality control. (NOS:MIN/N9426)
15. Analyze different organic compounds to identify the compound and determine various parameters. (NOS:MIN/N9427)

16. Analyze different organic compounds and measurement in respect of waste water management. (NOS:MIN/N9428)
17. Perform quantitative analysis of ore, alloy, organic and inorganic substance. (NOS:MIN/N9429)
18. Perform analysis of fuel gas, sugar, oil, fat, soap and nitrogen in fertilizer. (NOS:MIN/N9430)
19. Operate various measuring instruments used in chemical plant and laboratory. (NOS:MIN/N9431)
20. Perform proximate analysis of coal and calorific value of different fuels. (NOS:MIN/N9432)
21. Perform detection of micro-organism in food, pharmaceutical and other related laboratories. (NOS:MIN/N9433)
22. Perform Experiments on Analyzing Equipment(NOS:MIN/N9434)
23. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS:MIN/N9401)

7. TRADE SYLLABUS

SYLLABUS FOR LABORATORY ASSISTANT (CHEMICAL PLANT) TRADE			
FIRST YEAR			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
Professional Skill 50 Hrs.; Professional Knowledge 06 Hrs.	Identify common chemical reagents and prepare various types of solutions following safety precautions. (NOS:MIN/N9417)	1. Operate different types of fire extinguishers. (05hrs.) 2. Study Safety Data Sheet (SDS). (02hrs.) 3. Identify personal protection equipments (PPEs) used in chemical plant. (03hrs.)	Induction Training. Fire & Safety in Chemical Lab/Plant. First Aid. Introduction of pollution control. (02hrs.)
		4. Identify common chemical reagents by performing acid-base reaction. (04hrs.) 5. Identify common chemical reagents by performing precipitation reaction. (04hrs.) 6. Identify common chemical reagents by Performing colour change reaction. (04hrs.) 7. Identify common chemical reagents by generation of colour fume. (04hrs.) 8. Identify common chemical reagents by using Litmus Paper. (01 hrs.) 9. Identify common chemical reagents by performing reaction generating gas with specific smell. (04 hrs.) 10. Prepare solutions of solids by weighing. (04hrs.)	General & Physical Chemistry: Introduction to chemistry. Elements, atoms & molecules Chemical & physical changes. Concept about acid, base & salts. Determination of concentration of solutions by Normality & Molarity, IMP by weight by grams per liter. (04hrs.)

		11. Prepare solutions of liquids by weighing. (04hrs.) 12. Prepare solutions of volatiles by weighing. (03 hrs.) 13. Prepare primary standard solutions by weighing. (03 hrs.) 14. Prepare secondary standard solutions by weighing. (03 hrs.) 15. Prepare solutions of non-volatiles by weighing. (02 hrs.)	
Professional Skill 150 Hrs.; Professional Knowledge 36 Hrs.	Plan and estimate the strength of unknown acid, bases and other reagents by redox & iodimetric titration and prepare indicators and results of titration. (NOS:MIN/N9418)	16. Prepare various reagents for analysis of acid and base. (05 hrs.) 17. Prepare various indicators. (05hrs.) 18. Prepare Titration between Hydrochloric acid and sodium hydroxide. (05hrs.) 19. Prepare Titration between mixture of sodium carbonate and sodium bi-carbonate with hydrochloric acid (05hrs.). 20. Prepare Titration between vinegar and standard sodium hydroxide. (09hrs.) 21. Prepare Titration between Boric acid and sodium hydroxide. (08 hrs.) 22. Prepare Titration between Ammonium Chloride sample and sodium hydroxide.(08 hrs.) 23. Prepare Table for calculation of result	Atomic molecular and equivalent weights. Crystallography Solutions. The laws of chemical combinations. (15 hrs.)

		oftitration. (10 hrs.)	
		24. Prepare various reagents required for Redox titration (07hrs.). 25. Prepare various indicators required for Redox titration (07hrs.). 26. Prepare Permanganometry titration using permanganate solution. (10hrs.) 27. Prepare Dichrometry titrations using dichromate solution. (10hrs.) 28. Practice Redox titrations using potassium iodate solution. (10hrs.). 29. Practice Redox titrations using potassium bromate solution. (11hrs.)	Periodic table of the elements. Periodic study of S & P Block Elements: Periodic study of: a) Zero group b) Transition Elements of 3-12 groups Periodic study of: a) 14th group b) 15th group c)16th group d) 17th group e) 18th group elements. (15 hrs.)
		30. Prepare various reagents required for Iodometric and Iodimetric titration. (10 hrs.) 31. Prepare various indicators required for Iodometric and Iodimetric titration. (10 hrs.) 32. Prepare Iodometric titration using iodine solution indirectly. (10 hrs.) 33. Perform Iodimetric titration using iodine solution directly. (10 hrs.)	Chemical equilibrium. Thermo-chemistry & thermodynamics. (06 hrs.)
Professional Skill 100 Hrs.; Professional Knowledge	Execute precipitation and complex metric titration to determine the strength of unknown reagents and record the data.	34. Prepare various reagents required for precipitation titration. (10 hrs.) 35. Prepare various indicators required for precipitation titration. (10 hrs.) 36. Prepare exact end point	Metallurgy of: • Aluminum. • Copper • Silver • Chromium • Iron & Steel

18 Hrs.	(NOS:MIN/N9419)	detection by Mohr method. (15 hrs.) 37. Prepare exact end point detection by Volhard method. (15 hrs.)	• Zinc & its alloys. (09 hrs.)
		38. Prepare various reagents required for complex metric titration. (10 hrs.) 39. Prepare various indicators required for complex metric titration. (05 hrs.) 40. Prepare complex metric titration by using EDTA. (35 hrs.)	Non-Metals: Preparation, properties & uses of following: a) Hydrogen & its peroxide. b) Oxygen c) Sulphur& its compounds. d) Nitrogen & its compounds. e) Phosphorus & its compounds. f) Chlorine &Fluorine and its compounds. (09 hrs.)
Professional Skill 75 Hrs.; Professional Knowledge 11 Hrs.	Verify the physical/ thermal properties and record the analysis. (NOS:MIN/N9420)	**Physics Lab: -** 41. Verify parallelogram of forces with the help of mechanical board. (03hrs.) 42. Study of various types of Levers. (03hrs.) 43. Study of Simple Machines and finding Velocity Ratio, Mechanical Advantage and Efficiency. (04hrs.) 44. Determine acceleration due to gravity (g) by simple pendulum. (05 hrs.) 45. Determine Young's Modulus (Y) by Searle's apparatus (10 hrs.)	Moment and Levers: moments, units, arm of couple and moment of couple, types of Levers. Simple machines, efforts and load, mechanical advantage, velocity ratio, efficiency of machines, their relationship, examples. (04 hrs.)
		46. Determine coefficient of expansion of solid. (05 hrs.) 47. Determine coefficient of Thermal conductivity of metal rod. (05 hrs.) 48. Determine coefficient of	Elasticity, Introduction, stress and strain, modulus of elasticity, different types of stresses, Hook's Law, Young's modulus, Yield point, ultimate, stress-strain graph,

		Thermal conductivity of insulating material (Rubber).(15hrs.)	modulus of Rigidity, poison ration, bulk modulus, factor of safety, examples. (04 hrs.)
		49. Determine mechanical equivalent of heat by Joule's method. (25hrs.)	Heat and Temperature Heat, unit of heat, temperature, difference between heat and temp., modes of heat transfer, boiling point, melting point, scale of temp., specific heat, thermal capacity, water equivalent of heat, interchanges of heat, latent heat of fusion, latent heat of vapour, transmission of heat, thermal expansion of solids, liquids and gases, co-efficient of linear expansion, indicated thermal efficiency, brake thermal efficiency, examples. (03 hrs.)
Professional Skill 25 Hrs.; Professional Knowledge 07 Hrs.	Identify and test various electrical components like switches, fuses, conductors etc. (NOS:MIN/N3103)	50. Study various types of electric cells, resistances using series connections and measure various parameters viz. voltage, current, resistance using various meters and instruments etc. (12 hrs.) 51. Study various types of electric cells, resistances using parallel connections and measure various parameters viz. voltage, current , resistance etc. (13 hrs.)	**Electricity:** Electric current, +Ve and -Ve terminals use of fuses and switches, conductors and insulators, simple electrical Circuits. (07 hrs.)
Professional Skill 25 Hrs.; Professional Knowledge	Identify, test various electrical properties using proper measuring	52. Verify Ohm's law (06hrs.) 53. Verify Kirchhoff's law related to current and voltage. (07 hrs.)	Ohm's law, electrical insulating Materials, Kirchhoff's law, examples, Parallel and series circuit

07 Hrs.	instruments and apply this knowledge to troubleshoot power supplies. (NOS:MIN/N3104,MIN/N3105)	54. Determine specific resistance using wheat stone's Bridge. (12 hrs.)	connections. Whetstone's bridge potentiometer. (07 hrs.)
Professional Skill 25 Hrs.; Professional Knowledge 07 Hrs.	Verify the Electro-chemical properties of electrolytes. (NOS:MIN/N9421)	55. Perform electrolysis using voltmeter and verify Faraday's First law of electrolysisand second laws of electrolysis. (25 hrs.)	Electrolysis, conservation of electrical energy into heat energy, Joule's law. Mechanical equivalent of heat. (07 hrs.)
Professional Skill 150 Hrs.; Professional Knowledge 36Hrs.	Execute quantitative analysis of metal and non-metal by Gravimetric estimations, perform stoichiometry calculations and record the results. (NOS:MIN/N9422	56. Prepare suitable reagents by weighing for Gravimetric estimations of Nickel. (05 hrs.) 57. Prepare suitable reagents by weighing for Gravimetric estimations of Iron.(10 hrs.) 58. Prepare suitable reagents by weighing for Gravimetric estimations of Barium.(05 hrs.) 59. Prepare suitable reagents by weighing for Gravimetric estimations of Lead.(10 hrs.) 60. Prepare suitable reagents by weighing for Gravimetric estimations of Silicon.(10 hrs.) 61. Perform chemical reaction between reagents and collection of precipitation for Nickel.(10 hrs.) 62. Perform chemical reaction between reagents and collection of precipitation for Iron.(10hrs.) 63. Perform chemical reaction between reagents and collection of precipitation for	General & Physical Chemistry The structure of atom. The structure of atom, Radioactivity, Chemical bonding electronic theory of valency, Gas laws, Boyle's law, Charl's law, Gas equation, Graham's Law of diffusion, Dalton's law of partial pressure. (36 hrs.)

		Barium.(10 hrs.) 64. Perform chemical reaction between reagents and collection of precipitation for Lead.(10 hrs.) 65. Perform chemical reaction between reagents and collection of precipitation for Silicon.(10 hrs.) 66. Perform furnace operation for complete drying of precipitation. (30 hrs.) 67. Estimate quantity of dried precipitation by weighing.(15 hrs.) 68. Prepare table formation and stoichiometric calculation for final estimation of given metal & non-metal.(15 hrs.)	
Professional Skill 165 Hrs.; Professional Knowledge 33 Hrs.	Perform detection of inorganic substances by qualitative analysis,by dry tests, wet tests and record the procedures. (NOS:MIN/N9423)	69. Identify Inorganic substances by their physical properties (colour, solubility, acidic or basic nature). (05hrs.) **Dry test for cations:** 70. Identify Inorganic substances by dry test tube heating. (05hrs.) 71. Identify Inorganic substances by Flame test. (05hrs.) 72. Identify Inorganic substances by Borax Bead test. (05hrs.) 73. Identify Inorganic substances by Fusion test. (05hrs.) **Dry test for Anions:** 74. Identify Inorganic substances by reaction with dilute acids. (05hrs.) 75. Identify Inorganic substances	Fertilizer its types & uses Atmosphere air, Electro-chemistry & electrolysis, Water & its type, Water Treatment (Purification). Law of mass action, Le-chatelier's principle and application in chemical industry. Study of physical properties of substances. Study of Rault's Law for dilute solution. (33 hrs.)

		by reaction with concentrated acids. (05hrs.) **Wet test for cations:** 76. Identify Inorganic substances by wet test for Gr-I metals. (10 hrs.) 77. Identify Inorganic substances by wet test for Gr-II metals. (10 hrs.) 78. Identify Inorganic substances by wet test for Gr-IIIA metals. (10 hrs.) 79. Identify Inorganic substances by wet test for Gr-IIIB metals. (10 hrs.) 80. Identify Inorganic substances by wet test for Gr-IV metals. (10 hrs.) 81. Identify Inorganic substances by wet test for Gr-V metals. (10 hrs.) **Wet test for Anions:** 82. Identify Inorganic substances by wet test for Chloride. (05 hrs.) 83. Identify Inorganic substances by wet test for Bromide. (10 hrs.) 84. Identify Inorganic substances by wet test for Iodide. (05 hrs.) 85. Identify Inorganic substances by wet test for Flouride. (05 hrs.) 86. Identify Inorganic substances by wet test for Sulphate. (05 hrs.) 87. Identify Inorganic substances by wet test for Sulphide. (05	

		hrs.) 88. Identify Inorganic substances by wet test for Sulphite. (05 hrs.) 89. Identify Inorganic substances by wet test for Thiosulphate. (05 hrs.) 90. Identify Inorganic substances by wet test for Nitrate & Nitrite. (05 hrs.) 91. Identify Inorganic substances by wet test for Phosphate. (05 hrs.) 92. Identify Inorganic substances by wet test for Chromate. (05hrs.) 93. Identify Inorganic substances by wet test for Carbonate & Bi-Carbonate. (05 hrs.) 94. Identify Inorganic substances by wet test for Borate. (05 hrs.)	
Professional Skill 75 Hrs.; Professional Knowledge 11 Hrs.	Assemble, Test, calibrate and troubleshoot the pressure, temperature, recording instrument andcontrolling instruments. (NOS:MIN/N9424)	95. Perform Calibration of Bourdon tube pressure gauges. (04hrs.) 96. Perform operation of Manometer. (04hrs.) 97. Perform Calibration of Alcohol in glass thermometer. (08 hrs.) 98. Perform Calibration of bimetallic thermometer. (09hrs.) 99. Perform operation of Resistance thermometer. (08 hrs.) 100. Perform operation of Thermocouple. (08 hrs.) 101. Perform operation of	Units of pressure and vacuum; various types of pressure and vacuum gauges, manometers; principles of operation of various pressure measuring instruments and devices; Calibration of gauges. Temperature scales, Relationship between various temperature scales; fixed points. Various types of thermometers, thermocouples and pyrometers; Working principles of various temperature measuring instruments; different

		Thermocouple Pyrometer. (09 hrs.)	methods of temperature measurement. (09 hrs.)
		102. Perform Operation of Strip chart and Circular chart recorders. (08 hrs.) 103. Perform Operation of Transmitterand Transducers (PI & IP). (08 hrs.) 104. Perform Operation of controller. (09 hrs.)	Various types of Recorders strip chart, circular chart; principles of operation of various recording instruments and their operations. Various types of Controllers On-off, P, PI, PD, PID principles of operation of various controlling instruments and their operations. Various types of Transmitters and transducers PI, IP; principles of operation of various Transmitters and transducers. (02 hrs.)
ENGINEERING DRAWING (40 Hrs.)			
Professional Knowledge ED- 40 Hrs.	Read and apply engineering drawing for different application in the field of work. (NOS:MIN/N9402)	**Engineering Drawing:** Introduction to Engineering Drawing and Drawing Instruments – Conventions Sizes and layout of drawing sheets Title Block, its position and content Drawing Instrument Free hand drawing of – Geometrical figures and blocks with dimension Transferring measurement from the given object to the free hand sketches. Free hand drawing of hand tools. Drawing of Geometrical figures: Angle, Triangle, Circle, Rectangle, Square, Parallelogram. Lettering & Numbering – Single Stroke Dimensioning Practice Types of arrowhead Symbolic representation – Different symbols used in the related trades Reading of chemical plant Circuit Diagram Reading of Chemical plant Layout drawing	
WORKSHOP CALCULATION & SCIENCE (28 Hours)			
Professional	Demonstrate basic mathematical concept	**WORKSHOP CALCULATION & SCIENCE:** Unit, Fractions	

Knowledge WCS- 28 Hrs.	and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS:MIN/N9401	Classification of unit system Fundamental and Derived units F.P.S, C.G.S, M.K.S and SI units Measurement units and conversion Factors, HCF, LCM and problems Fractions - Addition, substraction, multiplication & division Decimal fractions - Addition, subtraction, multiplication & division Solving problems by using calculator Square root, Ratio and Proportions, Percentage Square and square root Simple problems using calculator Applications of Pythagoras theorem and related problems Ratio and proportion Ratio and proportion - Direct and indirect proportions Percentage Percentage - Changing percentage to decimal and fraction Material Science Types metals, types of ferrous and non ferrous metals Physical and mechanical properties of metals Mass, Weight, Volume and Density Mass, volume, density, weight and specific gravity Related problems for mass, volume, density, weight and specific gravity Heat & Temperature and Pressure Concept of heat and temperature, effects of heat, difference between heat and temperature, boiling point & melting point of different metals and non-metals Scales of temperature, Celsius, Fahrenheit, kelvin and conversion between scales of temperature Heat &Temperature - Temperature measuring instruments, types of thermometer, pyrometer and transmission of heat - Conduction, convection and radiation Concept of pressure - Units of pressure, atmospheric pressure, absolute pressure, gauge pressure and gauges used for measuring pressure Basic Electricity Introduction and uses of electricity, molecule, atom, how electricity is produced, electric current AC,DC their comparison, voltage, resistance and their units Trigonometry Measurement of angles Trigonometrical ratios
Project work / Industrial visit **Broad areas:**		

a) Estimate Iron as Fe2O3 by gravimetric analysis.
b) Identify interfering radicals present in an inorganic salt mixture.
c) Perform the removal of these interfering radicals.
d) Make Block diagram of process control loop.
e) Calibration of Bourdon type pressure gauge & measure pressure by this.

SYLLABUS FOR LABORATORY ASSISTANT (CHEMICAL PLANT) TRADE			
SECOND YEAR			
Duration	**Reference Learning outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
Professional Skill 135Hrs.; Professional Knowledge 38 Hrs.	Plan and organize the technique (with different unit process and unit operation) of organic compounds. (NOS:MIN/N9425)	105. Prepare Acetanilide by Acetylation. (04hrs.) 106. Determine % yield of Acetanilide. (02 hrs.) 107. Determine Melting point of Acetanilide. (02 hrs.) 108. Prepare Methyl Oxalate by Etherification. (10hrs.) 109. Determine % yield of Methyl Oxalate. (04 hrs.) 110. Determine Melting point of Methyl Oxalate. (02 hrs.) 111. Prepare sodium benzene sulphonate by Sulphonation. (10hrs.) 112. Determine % yield of sodium benzene sulphonate. (04hrs.) 113. Determine Melting point of sodium benzene sulphonate. (05 hrs.) 114. Prepare Nitrobenzene by Nitration. (05hrs.) 115. Determine % yield of Nitrobenzene. (05hrs.) 116. Determine Melting point of Nitrobenzene. (02 hrs.) 117. Prepare Tribromophenol by Halogination. (10hrs.) 118. Determine % yield of Tribromophenol. (05hrs.)	Introduction to Organic Chemistry. Purification of Organic Compounds. Purification of Organic Compounds. Types of organic reactions, Classification & nomenclature. Aliphatic hydrocarbons Halogen derivatives of hydrocarbons -aliphatic alcohol Ethers, Aldehydes, Ketones Carboxylic acid. Amides & Anhydride, Acid Halides Esters Oil & Fats. Soaps & Detergents. (38 hrs.)

		119. Determine Melting point of Tribromophenol. (02 hrs.) 120. Prepare oxalic acid by Oxidation. (15hrs.) 121. Determine % yield of oxalic acid. (05hrs.) 122. Determine Melting point of oxalic acid. (02 hrs.) 123. Prepare Aniline by reduction. (10 hrs.) 124. Determine % yield of Aniline. (05hrs.) 125. Determine Melting point of Aniline.(02 hrs.) 126. Determine % yield of Methyl orange, Ozazone, Glucosazone. (04hrs.) 127. Determine Melting point of Methyl orange. (05 hrs.) 128. Prepare soap by Saponification. (10 hrs.) 129. Determine % yield of soap. (05hrs.) 130. Determine saponification value. (02hr) 131. Prepare Aspirin. (05 hrs.) 132. Determine % yield of Aspirin. (05hrs.) 133. Determine Melting point of Aspirin. (02 hr)	
Professional Skill 125 Hrs.; Professional Knowledge 45 Hrs.	Plan and organize technique of inorganic substance with quality control. (NOS:MIN/N9426)	134. Prepare sodium carbonate. (20 hrs.) 135. Determine % yield & purity. (05 hrs.) 136. Prepare copper sulphate. (20 hrs.) 137. Determine % yield & purity. (5hrs.) 138. Prepare Mohr's salt. (20	Amines Cyanogen compounds Carbohydrates & Protein Polymers, Aromatic, Hydrocarbons, aromatic ethers. halogen derivatives Compounds with nitrogen urea (45 hrs.)

		hrs.) 139. Determine % yield & purity. (05 hrs.) 140. Prepare potash alum. (20 hrs.) 141. Determine % yield & purity. (05 hrs.) 142. Prepare potassium nitrate. (20 hrs.) 143. Determine % yield & purity. (05 hrs.)	
Professional Skill 120 Hrs.; Professional Knowledge 40 Hrs.	Analyze different organic compounds to identify the compound and determine various parameters. (NOS:MIN/N9427)	**Analysis of organic compounds to determine followings:** 144. Element present. (20 hrs.) 145. Functional group. (20 hrs.) 146. Melting point of organic compound. (5 hrs.) 147. Preparation of derivatives. (60 hrs.) 148. Melting point of derivatives for following groups of compounds: Alcohol, acid, carbohydrate, Nitro compounds, Amines, halogen compounds, sulphur compounds, phenolic compounds, Aldehyde, Ketone & Ester. (15 hrs.)	Aromatic acids Compounds of double & triple rings Heterocyclic compounds Diazonium salts, colour and dyes. Percentage of elements in chemical compounds Empirical formulae of chemical compounds. Empirical formulae of chemical compounds, balancing chemical equation. Principles of Material balance as applied in chemical industries; Examples of application of Material balance in heavy chemicals manufacturing viz. Sulphuric acid, Caustic Chlorine Plants. (40 hrs.)
Professional Skill 50 Hrs.; Professional Knowledge 18 Hrs.	Analyze different organic compounds and measurement in respect of waste water management. (NOS:MIN/N9428)	149. Analyze given sample of water to determine Chemical Oxygen DemandC.O.D. (05hrs.) 150. Analyze given sample of water to determine	Water Chemistry; Use of water in various industrial application viz. Steam generation; various chemical processes;. Principles of water analysis;

		Biological Oxygen Demand B.O.D. (05hrs.) 151. Analyze given sample of water to determine Total Suspended Solids T.S.S. (05 hrs.) 152. Analyze given sample of water to determine pH using different methods viz. pH paper, Indicators, pH Meter.(05 hrs.) 153. Analyze given sample of water to determine Total Hardness by EDTA method. (06 hrs.) 154. Analyze given sample of Boiler Blow Down water to determine caustic alkalinity.(06 hrs.) 155. Analyze given sample of water to determine Turbidity. (06 hrs.) 156. Analyze given sample of water to determine available chlorine.(06 hrs.) 154.Analyze given sample of water to determine Total Dissolved Solids TDS. (06 hrs.)	Meaning of the terms Hardness; Turbidity TDS, TSS, pH, DO, BOD, COD Available Chlorine, Principles adopted in determination of hardness of raw water; Analysis of Boiler feed water, Boiler Blow down Water. Principles of Analysis of Sewage water, Determination of COD, BOD, TDS, Turbidity and potable water for Municipal use, Principles of Chlorine estimation.(18 hrs.)
Professional Skill 125 Hrs.; Professional Knowledge 45Hrs.	Perform quantitative analysis of ore, estimate element, alloy, organic and inorganic substanceto estimate Pharmaceuticals (Drugs/Drug intermediates)	157. Perform chemical reaction for analysis of Bauxite or Zinc ore. (15 hrs.) 158. Estimate elements. (10 hrs.)	Flow sheet for industrial production of Ammonia, Nitric acis, sulphuric acid, urea, paper, sugar, caustic, chlorine & polymers. (09 hrs.)
		159. Perform chemical reaction for analysis of Brass or Soldering materials.(15 hrs.)	Alloys, Amalgams Definition, examples of Alloys used in industries; Principles of Analysis of Alloys to determine

	substances. (NOS:MIN/N9429)	160. Estimate elements. (10 hrs.)	compositions(09 hrs.)
		161. Perform chemical reaction for analysis of calcium in given tablet. (20 hrs.) 162. Estimate calcium. (5 hrs.)	Drugs/Drug intermediates Definitions, Examples. Principles of Analysis of Drugs/Drug intermediates.(09 hrs.)
		Estimation of formaldehyde by Iodometric method: 163. Prepare reagents. (05 hrs.) 164. Perform titration. (15 hrs.) 165. Prepare table for calculation & estimate % of formaldehyde in given sample. (05 hrs.)	Preservatives, Definition, Use, Examples of common preservatives, Principles of Analysis of Preservatives (09 hrs.)
		Estimation of aniline or phenol in the given solution by Bromination method: 166. Prepare reagents. (05 hrs.) 167. Perform titration. (15 hrs.) 168. Prepare table for calculation & estimate % of aniline or phenol in given sample. (05 hrs.)	Lipids, Definition, Meaning of the terms Oils, Fats, Acid Value, Saponification value, Iodine value; Rancidity Principles of Analysis of Lipids; Hydrogenated fat./Vanaspati Definition, Principles of checking adulteration of Ghee.(09hrs.)
Professional Skill 100 Hrs.; Professional Knowledge 36Hrs.	Perform analysis of fuel gas, sugar, oil, fat, soap and nitrogen in fertilizer. (NOS:MIN/N9430)	169. Prepare reagents for Orsat's Apparatus. (10 hrs.) 170. Perform operation of Orsat's Apparatus. (10 hrs.) 171. Estimate composition of gases. (05 hrs.)	Flue gas., Definitions, Examples, Standard Composition, Principles of Analysis of Flue gas, Solutions used in Orsat's Apparatus, Working Principles (09hrs.)
		172. Determine acid value of an oil or fat. (20hrs.) 173. Determine saponification value of an oil or fat. (20hrs.)	Percentage of elements in chemical compounds Empirical formulae of chemical compounds. Empirical formulae of

		174. Determine Iodine value of an oil or fat. (10hrs.)	chemical compounds, balancing chemical equation (18 hrs.)
		Determination of fat by Soxhlet's Extraction method: 175. Construct Soxhlet's apparatus by assembling different parts. (02hrs.) 176. Perform operation with given sample. (08hrs.) 177. Estimate % of fat in given sample. (02hrs.)	Electrolysis, Electro chemistry, electro-chemical series, Heat effect of electricity. (05hrs.)
		Estimation of nitrogen by Kjeldahl's method: 178. Construct Kjeldahl's apparatus by assembling different parts. (04hrs.) 179. Prepare reagents. (04hrs.) 180. Perform operation with given sample. (03hrs.) 181. Prepare table for calculation & estimate % of nitrogen in given sample. (02hrs.)	Fertilizer its types & uses, Examples, compositions; Meaning of the term NPK, Principles of Analysis of Fertilizers. Material balance. (04hrs.)
Professional Skill 110 Hrs.; Professional Knowledge 29 Hrs.	Operate various measuring instruments used in chemical plant and laboratory. (NOS:MIN/N9431)	182. Prepare reagents. (05 hrs.) 183. Perform operation of the instrument. (10 hrs.) 184. Prepare graph & table for calculation. (05 hrs.)	Radio chemistry, Decay of radio isotopes. Equation of decay half time value. (07 hrs.)
		Determination optical rotation of sugar solution by Polari-meter: 185. Prepare reagents. (05 hrs.) 186. Perform operation of the instrument. (10 hrs.) 187. Prepare graph & table for calculation. (05 hrs.)	Introduction to microbiology. (07 hrs.)

		Determination of % of elements by Electrolytic analyzer: 188. Prepare reagents. (05 hrs.) 189. Perform operation of the instrument. (05 hrs.) **Determine the PH of given solutions by using PH-meter & comparator (Visual Calorimeter):** 190. Prepare Buffer solution & reagents. (05hrs.) 191. Perform operation of the pH meter. (05 hrs.)	Introduction to Bacteria cell. Lovibond comparator. (03 hrs.) Sterilization - Details study. pH Meaning, scale, different methods of finding pH; Working Principles of Visual Colorimeter; Working Principles of PH-meter (02 hrs.)
		Determine concentration of unknown coloured solution by colorimeter: 192. Prepare reagents. (10 hrs.) 193. Perform operation of the instrument. (05 hrs.) **Determine concentration of unknown solution by Spectrophotometer :** 194. Prepare reagents. (10 hrs.) 195. Perform operation of the instrument. (05hrs.)	Colorimetric Analysis Applications Examples, &Principles of Colorimetric Analysis. Introduction to Nutrition of bacteria. (05 hrs.) **Spectrophotometer** Application, Examples, Working Principles of Electrolytic Analyzer, Features & specification of **Spectrophotometer,** Precautions to be observed. Introduction to Industrial Microbiology. (05 hrs.)
		Practice operation of following laboratory instruments: 196. Digital flame photometer (05hrs.) 197. Refractometer (oil/sugar) (05hrs.) 198. Karlfischer apparatus. (05hrs.) 199. Analysis of water quality used in industry (PH, TDS, TSS, HARDNESS and elements). (05hrs.)	Fuel (Definition, classification, properties, composition & uses) (09 hrs.)

		200. Digital moisture balance (05hrs.) 201. Brookfield viscometer (05hrs.) 202. Electrophoresis apparatus (05hrs.) 203. Pensky –Martin apparatus (Flash point). (10hrs.)	
Professional Skill 25 Hrs.; Professional Knowledge 09 Hrs.	Perform proximate analysis of coal and calorific value of different fuels. (NOS:MIN/N9432)	204. Determine moisture in given sample of coal. (03hrs.) 205. Determine volatile matter in given sample of coal. (03hrs.) 206. Determine ash content in given sample of coal (Furnace). (03hrs.) 207. Determine sulphur& fixed carbon in given sample of coal(C-S Det. App. LECO). (03hrs.)	Fuels its types & uses, Examples of Solid, Fuels, compositions; Meaning of the terms Moisture, VCM, Ash, FC, CV Principles of Analysis of Coal, Working Principles of Bomb Calorimeter.(05 hrs.)
		208. Determine calorific value of kerosene oil using Bomb Calorimeter. (04hrs.) 209. Determine calorific value of coal using Bomb Calorimeter. (06hrs.) 210. Determine calorific value of LPG using Jules Calorimeter. (03hrs.)	Identification of different micro-organism Micro- organisms & infections. Streptomycin Yeast Micro- organisms & infections. Streptomycin Yeast Bread, Alcohol, Beers, Wines (04 hrs.)
Professional Skill 25 Hrs.; Professional Knowledge 09 Hrs.	Perform detection of micro-organism in food, pharmaceutical and other related laboratories. NOS:MIN/N9433)	211. Perform Operation of Microscope. (08 hrs.) 212. Identify common laboratory equipment's used in microbiology. (02hrs.) 213. Prepare media required for inoculations. (05 hrs.)	**Microbiology techniques**, Applications, Examples of Gram +ve& Gram –ve Microbes, Methods of media preparation & incubation. Meaning of Disinfectant, Antiseptic, Reidel- Walker Coefficient, Working Principles

		214. Identify microorganism by Gram staining technique. (10hrs.)	of Microscope. (09 hrs.)
Professional Skill 25 Hrs.; Professional Knowledge 09 Hrs.	Perform Experiments on Analyzing Equipment. NOS:MIN/N9434)	215. To perform experiment on particle size by particle size analyzer (08 hrs.) 216. To perform experiment on solid analyzer. (08 hrs.) 217. To perform experiment on total surface area by surface area analyzer. (09 hrs.)	**Particle size Analyzer** Application, various types Examples, Working Principles ofParticle size AnalyzerFeatures& specification of Particle size Analyzer Precautions to be observed, Tyler series, Relationship between Particle size & Surface area. Working, Principles and Uses of Analyzing equipment. (09 hrs.)
WORKSHOP CALCULATION & SCIENCE (22 Hours)			
Professional Knowledge WCS- 22 Hrs.	Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS:MIN/N9401)	**<u>WORKSHOP CALCULATION & SCIENCE:</u>** Friction Friction - Advantages and disadvantages, Laws of friction, co-efficient of friction, angle of friction, simple problems related to friction Friction - Lubrication Friction - Co- efficient of friction, application and effects of friction in workshop practice Algebra Algebra - Addition , subtraction, multiplication & division Algebra - Theory of indices, algebraic formula, related problems Estimation and Costing Estimation and costing - Simple estimation of the requirement of material etc., as applicable to the trade Estimation and costing - Problems on estimation and costing	

Project work / Industrial visit

Broad areas:

a) Estimation of nitrogen of a given fertilizer by Kjeldehal's method.
b) Prepare Buffer of different pH & measure unknown pH by pH meter.
c) Determination of concentration of copper present in brass sample by Spectrophotometer.
d) Determination calorific value of Kerosene.
e) Identify micro-organism by staining method.