Name of Post	Post Code	Syllabus
NCB Cadre Official (Lab Analyst)	CRT-01	**SKILL TEST:** Laboratory skill assessment will be held for the eligible candidates in physical and chemical testing of cement and building materials like hydraulic cements, clinker, cement raw materials, admixtures, fuel, fly ash, slag, aggregate, bricks, water, soil etc. as per relevant Indian standard codal requirements. **WRITTEN TEST:** **Cement:** Classification of cement, cement raw materials, manufacture of cement and the setting process, additives used in cement manufacture, industrial byproducts and its utilization in cement manufacture. Indian standard methods for analysis of cement and its raw materials, concrete, building materials, ores and minerals, fuel, water, soil and industrial byproducts. Importance of accuracy, precision and sources of error in analytical measurements. **Chemical Analysis :** Different units of concentration (molarity, molality, normality and formality), Preparations of standard solutions, concept of primary and secondary standards, Titrations involving Acids-Bases, Principles of acid-base titrations, Principle behind selection of an appropriate indicator, Standardization of NaOH solution, Standardization of KMnO4 solution, Determination of oxide contents in ores / alloys using appropriate titrimetric method, Complexometric Titrations, Principles of complexometric titrations, determination of oxides by titrimetric method using EDTA. **Chemical Bonds:** The covalent bond and the structure of molecules, Hybridization and structure, Intermolecular forces, van der Waals forces, Hydrogen bonding and its applications, effects of these forces on melting point, boiling point and solubility. **Transition Elements:** Electronic configuration, oxidation state, variable valency, colour, magnetic and catalytic properties, ability to form complexes and stability of various oxidation states for Cr, Mn, Fe and Cu. **Analytical Chemistry and instrumentation:** Fundamental laws of spectroscopy and selection rules, validity of Beer-Lambert‘s law. UV-Visible Spectrometry, Basic principles of instrumentation like choice of source, monochromator and detector, etc for single and double beam instrument; Basic principles of quantitative analysis: estimation of metal ions from aqueous solution, geometrical isomers **Infrared Spectrometry:** Basic principles of instrumentation (choice of source, monochromator & detector) for single and double beam instrument; sampling techniques. Structural illustration through interpretation of data, Effect and importance of isotope substitution. **Flame Atomic Absorption and Emission Spectrometry:** Basic principles of instrumentation (choice of source, monochromator, detector, choice of flame and Burner designs. Techniques of atomization and sample introduction; Method of background correction, sources of chemical interferences and their method of removal. Techniques for the quantitative estimation of trace level of metal ions from water samples. **Thermal methods of analysis:** Theory of thermogravimetry (TG), basic principle of instrumentation. Techniques for quantitative estimation of Ca and Mg from their mixture **Electroanalytical methods :** Classification of electroanalytical methods, basic principle of pH metric, potentiometric and conductometric titrations. Techniques used for the determination of equivalence points. Techniques used for the determination of pKa values.