

**सहायक रासायनिक विश्लेषक, न्यायसहायक वैज्ञानिक प्रयोगशाला संचालनालय,
सामान्य राज्य सेवा, गट-ब
गृह विभाग**

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परीक्षेचे टप्पे: १) लेखी परीक्षा: २०० गुण

२) मुलाखत: ५० गुण

-: परीक्षा योजना :-

विषय व सांकेतांक	माध्यम	प्रश्नसंख्या	गुण	कालावधी	दर्जा	प्रश्नपत्रिकेचे स्वरूप
विभागाशी व पदाच्या कर्तव्य व जबाबदा-यांशी संबंधित घटक (११९७)	इंग्रजी	१००	२००	एक तास	पदव्युत्तर पदवी	वस्तुनिष्ठ बहुपर्यायी

अ) नकारात्मक गुणदान:

५) प्रत्येक चुकीच्या उत्तराकरीता २५% किंवा १/४ एवढे गुण एकुण गुणांमधून वजा/ कमी करण्यात येतील.
६) एखाद्या प्रश्नाची एकापेक्षा अधिक उत्तरे दिली असल्यास अथवा ज्या उमेदवाराने उत्तरपत्रिकेत पूर्ण वर्तुळ चिन्हांकित केले नसेल अशा प्रश्नाचे उत्तर चुकीचे समजण्यात येऊन त्या प्रश्नाच्या उत्तराकरीता २५% किंवा १/४ एवढे गुण एकुण गुणांमधून वजा/ कमी करण्यात येतील.
७) वरीलप्रमाणे कार्यपद्धतीचा अवलंब करतांना एकुण अंतिम गुणांची बेरीज अपूर्णाकात आली तरीही ती अपूर्णाकातच राहील व पुढील कार्यवाही त्याच्या आधारे करण्यात येईल.
८) एखाद्या प्रश्नाचे उत्तर अनुत्तरित असेल तर, अशा प्रकरणी नकारात्मक गुणांची पद्धत लागू असणार नाही.

ब) अंतिम गुणवत्ता यादी ही वस्तुनिष्ठ परीक्षेतील व मुलाखतीतील एकत्रित गुणांवर आधारीत राहील.

-: अभ्यासक्रम :-

विभागाशी व पदाच्या कर्तव्य व जबाबदा-यांशी संबंधित घटक या विषयामध्ये खालील घटक व उपघटकांचा समावेश असेल.

Sr. No.	Topic
1.	Analytical Chemistry
a.	Basic aspects - Sampling-solid, liquid and gas, molecular and equivalent weight, molarity, molality, normality, solution preparations in w/w, w/v and v/v, mole concept, concentrations, ppm, ppb and ppt etc. Calibration and validation- Calibration curve, regression analysis, external standard, internal standard, standard addition method etc.
b.	Statistical treatment of the results - accuracy, precision, sensitivity, detection limit. Errors and their types, mean, median, standard deviation, relative standard deviation, Gaussian curve, t-test, F-test, confidence interval. Criteria for selection of analytical methods- Accuracy, precision, sensitivity, selectivity, specificity, detection limit.
c.	Titrimetry - Different types of titrations such as acid-base, complexometric, redox, precipitation, etc. different standards used for standardisation such as primary standard and secondary standard. Potentiometric and conductometric titration and their applications.
d.	Gravimetric and thermogravimetric analysis - Precipitation, different types of precipitants used in gravimetric analysis. pH requirement for precipitation. Quantitative analysis. Thermogravimetric analysis-Mass spectrometry for qualitative and quantitative analysis. Problems.

	e.	Separation techniques - Extraction, different distillation methods such as vacuum distillation, steam distillation, fractional distillation etc. Purification and identification of substances.
2.	Analytical Techniques in Inorganic Chemistry for Different Inorganic Samples	
	a.	Spectroscopy and chromatography for inorganic sample analysis - Atomic absorption, atomic emission, and inductively coupled plasma-atomic emission and Mass spectrometry (ICP-AES and ICP-MS). UV-Visible spectroscopy with qualitative and quantitative analysis, Jobs Method. Applications. Ion exchange chromatography- Analysis of various inorganic cations and anions.
	b.	Microscopy for inorganic sample analysis - Trace and heavy metal, glass, soil, and liquid samples analysis using scanning electron microscopy (SEM), Energy dispersive spectroscopy (EDS)
	c.	Electroanalytical techniques- Coulometry and its types, amperometry, voltammetry, cyclic voltammetry, stripping voltammetry, polarography,
3.	Analytical Techniques in Organic Chemistry	
	a.	Spectroscopy - Theory and application of UV Visible, IR(FTIR), Raman, NMR, Mass spectrometry, Interpretation of spectra, Structure Elucidation
	b.	Separation techniques – Theory and application in chemical analysis of TLC, HPTLC, GC, GCMS, LCMS, HRMS, column chromatography, paper chromatography. HPLC- Ion exchange chromatography, Adsorption chromatography, Normal and Reverse phase chromatography, solid phase extraction,
	c.	Organic analysis - Pharmaceutical and Narcotic drugs psychotropic substances, alcohol estimation, petroleum products, paints and dyes, rubber, plastic, fibres, organic poisons such as insecticides, pesticides, herbicides, etc.
4.	Analytical Techniques in Biochemistry	
	a.	Biomolecules - Structure, functions and estimation of carbohydrates, lipids, proteins, nucleic acids and biological buffers.
	b.	Molecular biology - DNA isolation, DNA quantification, PCR, RT-PCR, RFLP (Restriction Transcriptase Polymerase Chain Reaction), ELISA, RIA (Radio Immuno Assay), Antigen -Antibody reactions.
	c.	Separation techniques- SDS-PAGE, One dimension (PAGE) and two dimension electrophoresis, Isoelectric focusing, Gel filtration Chromatography, Affinity chromatography, High voltage electrophoresis, Agarose electrophoresis, Capillary electrophoresis.
	d.	Isotope tracer technique: Basic concepts, Principles, advantages, limitations, and applications in biochemistry.
	e.	Enzymes- Enzyme classification, Isoenzymes, DNA polymerase, Enzyme kinetics (basic)
	f.	Blood and other body fluids and hair examinations for humans and animals - Blood group system, Semen examination, Saliva, Urine, Hair, Sweat, Biological stains and preservations.