

NATIONAL REMOTE SENSING CENTRE
ADVERTISEMENT NO.NRSC/RMT/3/2017 DATED 20.05.2017

Name of the Post : Scientific Assistant

Post No.: SA1

SYLLABUS - WRITTEN TEST

Type of Examination	:	Objective Type (Multiple Choice Questions)
No. of Questions	:	80 Questions
Apportionment of marks	:	Each Question carries one mark.
Duration of Examination	:	02 Hours

Written Test will broadly comprise of the following topics as covered in B.Sc. Curriculum.

Inorganic Chemistry

1. Atomic Structure-Aufbau principle, shapes of S, P, d and f orbitals. S, P, d and f block elements - classification and characteristic properties.
2. Periodicity of Properties- atomic radii, ionic radii. ionisation potential, electron affinity and electronegativity
3. Principles of inorganic Analysis-acid base equilibria, common ion effect, solubility product and their applications in qualitative analysis, spot test reagents and nessler's reagent
4. Types of Solvents-Protic and aprotic solvents, aqueous and non aqueous solvents, liquid ammonia
5. Theory of bonding. Valence bond theory - hybridization, geometry and magnetic properties. Ionic Bond, Covalent Bond
6. Molecular Orbital Theory
7. Chemistry of S Block Elements-Hydrides - Classification and Chemistry, Alkali Metals, Alkaline Earth Metals
8. Principles of Volumetric Analysis- molality, normality, molarity and mole fraction - primary and secondary standards. acid-base, red-ox, complexometric, iodometric titrations.
9. Characteristics of 'p' and 'd' block elements
10. Carbon family/Nitrogen family, Oxygen family, Halogens, Noble Gases

Nuclear Chemistry

1. Natural radioactivity, Fundamental particles of the nucleus, Nuclear binding energy, Artificial radioactivity

Industrial Chemistry

1. Fuel gases.- Calorific value, composition and sources/formation of water gas, semi-water gas, carbonated water gas, producer gas, oil gas, natural gas, LPG and bio gas.
2. Water - causes for hardness of water; degree of hardness - removal of hardness

Pollution and its Control

1. Sources of air pollution, green house effect, global warming; Pollution of soil, Pollution of water, Noise pollution and radioactive pollution

Physical Chemistry

1. Quantum Chemistry, Gaseous State, Liquid State, Solid State, Mesomorphic State
2. Solutions - Solutions of gases in liquids - Henry's law - solution of liquids in liquids. Raoult's law - Clapeyron - Clausius equation
3. Distribution law - Thermodynamic derivation and applications.
4. Phase equilibria - Adsorption - Physisorption and chemisorption - Freundlich adsorption isotherm - Langmuir adsorption isotherm - BET equation ; applications of adsorption, Catalysis
5. Laws of Thermodynamics - First law, Second law and third law of thermodynamics, Concept of entropy, Gibbs free energy, Joule's Law, Thermochemistry Bond Energy, Chemical kinetics, Collision theory and derivation of rate constant for bimolecular reactions
6. Photochemistry laws; Metallic and electrolytic conductors, Theory of strong electrolytes, Applications of conductivity measurements- Galvanic cell, Derivation of Nernst equation for electrode potential and cell emf sign conventions, Applications of emf measurements, Applications of concentration cells, Polarisation, Concept of fugacity and activity

Organic Chemistry

1. Basic concepts of bonding in organic chemistry, Nomenclature of organic compounds, Alkanes, Alkenes, Alkynes, Alcohols and Phenols, Polymerisation, Cycloalkanes, Coordination compounds, Stereoisomerism, Optical isomerism, Optical activity, Geometrical isomerism, Aminoacids and proteins, Natural Products, Alkaloids, Polynuclear hydrocarbons

Analytical Chemistry

1. Data analysis - Theory of errors, precision - accuracy ; Principles of gravimetric analysis, Thermal analytical methods, Separation and purification techniques, Purification of solid organic compounds, Chromatography techniques, UV- Visible spectroscopy, Infrared spectroscopy, Raman spectroscopy, Polarography, Polarimetry principle, NMR spectroscopy, Mass spectroscopy, X-ray methods

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Name of the Post : Scientific Assistant

Post No. : SA2

SYLLABUS - WRITTEN TEST

Type of Examination	:	Objective Type (Multiple Choice Questions)
No. of Questions	:	80 Questions
Apportionment of marks	:	Each Question carries one mark.
Duration of Examination	:	02 Hours

Written Test will broadly comprise of the following topics as covered in B.Sc. Curriculum.

Mathematics

1. Real Analysis
2. Elementary Number Theory
3. Groups and Rings
4. Linear Algebra
5. Ordinary and Partial Differential Equations
6. Vector Calculus
7. Solid Geometry

Statistics

1. Probability
2. Distribution Theory
3. Estimation
4. Testing of Hypotheses
5. Non-Parametric Tests
6. Multivariate Tests
7. Sampling Techniques
8. Linear models and analysis of experimental designs
9. Optimization Techniques

Computer Science

1. Mathematical Foundations
2. Computer Organization
3. Programming: Programming in C, Object oriented programming concepts including classes, Polymorphism, Inheritance, and Programming in C++, Java and Python.
4. Data Structures
5. Design and Analysis of Algorithms: Algorithm complexity, Algorithms Design Techniques – Divide and Conquer, Greedy Method, Dynamic Programming, Backtracking, Branch and Bound, NP-Hard and NP-Complete Problems.
6. Principles of Programming Languages: BNF, Variables, Data Types, Control Structures, Scope and Extent, Data Abstraction, Concurrency concepts, Exception Handling, Functional Programming, and Logic Programming.
7. Compiler Design

8. Operating Systems
9. Database Management Systems
10. Computer Graphics
11. Computer Networks
12. Software Engineering
13. Object oriented Analysis and Design
14. Network Security
15. Distributed Operating Systems

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Name of the Post: Scientific Assistant

Post No. : SA3

SYLLABUS - WRITTEN TEST

Type of Examination	:	Objective Type (Multiple Choice Questions)
No. of Questions	:	80 Questions
Apportionment of marks	:	Each Question carries one mark.
Duration of Examination	:	02 Hours

Written Test will broadly comprise of the following topics as covered in B.Sc. Curriculum.

Mathematics

1. Real Analysis
2. Elementary Number Theory
3. Groups and Rings
4. Linear Algebra
5. Ordinary and Partial Differential Equations
6. Vector Calculus
7. Solid Geometry

Physics

1. Mechanics - Fundamentals of Dynamics, Work & Energy, Collisions, Rotational Dynamics, Elasticity, Fluid Motion, Gravitation and Central Force Motion, Oscillation, Non-Inertial Systems, Special Theory of Relativity.
2. Electricity & Magnetism – Electric Field & Electric Potential, Dielectric properties of matter, Magnetic Field, Magnetic properties of matter, Electromagnetic Induction, Electrical Circuits, Network Theorems, Ballistic Galvanometer.
3. Waves & Optics – Superposition of Collinear Harmonic Oscillations, Superposition of two perpendicular Harmonic Oscillations, Wave motion, Velocity of waves, Superposition of two harmonic waves, Wave Optics, Interference, Interferometer, Diffraction, Fraunhofer Diffraction, Fresnel Diffraction.
4. Thermal Physics – Introduction to Thermodynamics, Zeroth & First law of Thermodynamics, Second law of Thermodynamics, Entropy, Thermodynamic Potentials, Maxwell's Thermodynamic relations, Kinetic Theory of Gases, Distribution of Velocities, Molecular Collisions.
5. Elements of Modern Physics.
6. Statistical Mechanics & Electromagnetics: Classical Theory of Radiation, Quantum Theory of Radiation, Maxwell Equations.
7. Quantum Physics – Time dependent Schrodinger equation, Time independent Schrodinger equation.

Computer Science

1. Mathematical Foundations
2. Computer Organization
3. Programming: Programming in C, Object oriented programming concepts including classes, Polymorphism, Inheritance, and Programming in C++, Java and Python.
4. Data Structures
5. Design and Analysis of Algorithms: Algorithm complexity, Algorithms Design Techniques – Divide and Conquer, Greedy Method, Dynamic Programming, Backtracking, Branch and Bound, NP-Hard and NP-Complete Problems.
6. Principles of Programming Languages: BNF, Variables, Data Types, Control Structures, Scope and Extent, Data Abstraction, Concurrency concepts, Exception Handling, Functional Programming, and Logic Programming.
7. Compiler Design
8. Operating Systems
9. Database Management Systems
10. Computer Graphics
11. Computer Networks
12. Software Engineering
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