CHEMISTRY DEPARTMENT

Syllabus for Written Test to Ph. D Programme, June 2018

Group A: (30 Marks: MCQ)

1) Logical Reasoning, Data Analysis & Interpretation and Verbal Ability:

Number Sequence Completion, Pattern Completion, Sets based on grouping and patterns, Seating Arrangement problems, Circular Arrangements, Relational problems, Selection and Conditionals, Mapping and best routes, Miscellaneous sets consisting of formal logic, testing, sports events and other critical reasoning, Data Analysis, Data Interpretation, Data Sufficiency, Reading Comprehension, Verbal Logic, Vocabulary, Grammar Correction.

2) General information on Science and its interface with society to test the candidate's awareness of science, aptitude of scientific and quantitative reasoning, Common elementary Computer Science, Programming instructions, simple algorithms and computational methods.

Group B: (40 Marks: MCQ)

This section will cover fundamentals from Physical, Inorganic and Organic Chemistry.

Group C: (30 Marks: Descriptive)

Candidate is required to answer one of the groups. However, his/her selection may not be limited to that specialization only.

A) Inorganic Chemistry:

Chemical periodicity, Structure and bonding in homo- and heteronuclear molecules, including shapes of molecules, Concepts of acids and bases, Chemistry of main group elements, Chemistry of transition elements, Organometallic Chemistry, Bio-inorganic Chemistry, Nuclear Chemistry, Solid State Chemistry.

B) Organic Chemistry:

IUPAC nomenclature of organic compounds, Stereochemistry, Reactive intermediates and organic reaction mechanism, Concept of aromaticity, Pericyclic reaction, Organic name reactions, Transformations and rearrangements, Organic photochemistry, Oxidation and reduction of functional groups, Common organic, inorganic and organometallic reagents in organic synthesis, Natural products, Heterocyclic chemistry, Physical characterization of organic compounds by IR, UV, Mass and NMR.

C) Physical Chemistry:

First, second and third laws of thermodynamics, spontaneity and equilibria; Le Chatelier's principle; phase rule, phase transitions; Boltzmann distribution; partition functions and their relation to thermodynamic quantities – calculations for model systems; Rate laws, steady state approximation, collision and transition state theories of rate constants, unimolecular reactions; homogeneous catalysis; Electrochemistry; Chemical applications of group theory; Rotational, vibrational and electronic spectroscopy; Basic principles of quantum mechanics.

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