

Syllabus for Pre-Ph.D. Courses in Chemical Sciences

Instructions

1. The Ph.D. Course work syllabus of 200 marks will be divided into two papers. Each paper will be of 100 marks.
2. The First paper of 100 marks consists of two groups A and B and will be known as Research Methodology.
Group- A – 80 marks – 5 Units (Ethics, philosophy, nature, concept, importance, prospects and utility of research) The candidates will have to answer 5 questions out 10 at least 1 from each unit 02 questions will be asked from each unit.

Group- B – 20 marks – 1 Units (Knowledge of computer) The candidates will have to answer 2 questions out 04.
3. The Second paper of 100 marks will be completely subject-oriented (comprehensive and deep knowledge of the subject) and will be divided into two groups.
Group- A – 60 marks – This group will be of 04 units. The candidates will have to answer 04 questions out 08, at least 01 question from each unit. 02 questions will be asked from each unit.

Group- B – 40 marks – This group will be 03 parts.

Part-A – 20 marks – The candidate will have to write 01 research paper OR assignment in about 2000 to 3000 words concerning to his subject or area of interest.
Part- B – 10 marks – The candidate will have to participate in PPP (PowerPoint Presentation) concerning his topic or subject.

Part- C – 10 marks – The candidate will have to appear in the Viva-Voce which will be held in the concerned department.
4. The candidate will have clear all papers with appropriate passing marks(55 per cent or the equivalent grade), then they will be eligible for the submission of their research proposal or synopsis in the meeting of the PGRC (Post Graduate Research Council).

Paper-I

(Full Marks 100)

Group – A

Full marks 80

Research Methodology

The candidates will have to answer 05 questions out of 10 questions, at least 01 question from each unit.

Unit-1 Research Methods:

Selection, Formulation and designing of a research plan, research survey, materials & documentations of data, sampling, field studies, chemical structure drawing programme, graph plotting, literature search techniques with respect to subject, Substance, Author, chemical formula. Paper writing and submission technique.

Unit-2 Research Ethics:

Basic principals, significance, validity of scientific investigation, ethical guideline, Anti-plagiarism.

Unit-3 Scientometrics:

Standard National and International Journals, Tools for citing and referencing using Journal Indexed in Scopus, Google Scholar, Web of Science, Indian Citation Index, Scientific citation Index, Single and Double Blind Peer review, IF, H-index.

Unit-4 Quantitative data analysis:

Standard deviation, Standard error, Data comparing by test analysis of variance, T' test, F' test, Chi Square test, Least square, Correlation and Regression analysis.

Unit-5 Techniques for Chemical research:

Colorometry, spectrometry, chromatography, polography, cyclic voltammetry, magnetic susceptibility, X-ray, SEM, TEM studies.

Group – B

Full marks 20

The candidates will have to answer 02 questions out of 04 questions.

Basic Computer:

Introduction to operating systems, Windows, MS Office, PowerPoint, Word, Excel, virus and protection. Acquaintance with www, IP, email, application programs; tips on PC maintenance, basic setup of printer, scanner and other peripherals. Video conferencing tools.

How can computational ability be useful in research (using a programming language); data representation and conversion between various number systems.

Paper-II

(Full Marks 100)

Group – A

Full marks 60

Advances in Chemistry

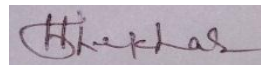
The candidates will have to answer 04 questions out of 08 questions, at least 01 question from each unit.

- Unit-1 a) Synthesis and Characterization of Inorganic and complex molecules by IR., Electronic, NMR, ESR, Mossbauer spectral technique . Derivation of various parameters like Dq, B, β , Dt, Ds, etc.
b) Basic principle of thermal analysis, TG, DTA, DSC & their applications.
- Unit-2 a) Extraction and characterization of main constituents of Natural product by FTIR, uv, nmr, mass spectral studies.
b) Green synthesis and characterization of organic and pharmaceutical molecules using different spectral studies like above.
c) Microbes and microbial processes (Fermentation technology)
- Unit-3 **Study of Pollution in hydrosphere & atmosphere.**
Different Pollution parameters like pH, alkalinity, hardness, D.O, B.O.D, COD, CO₂, NO₂, SO₂, Heavy metals (Pb, Hg, AS, Cr), Fluoride, Chloride, TDS, Pesticides etc. Concept of parameters for the analysis of water.
- Unit-4 **Nanomaterials:**
Synthesis, Characterization and Properties of different types of Nanomaterials.

Group – B

Full marks 40

Part I – Research paper / Review/ Proposal Writing	20 marks
Part II – Power point Presentation	10 marks
Part III – Viva Voce	10 marks



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