



राजा शंकर शाह विश्वविद्यालय छिंदवाड़ा (म.प्र.)

RAJA SHANKAR SHAH UNIVERSITY CHHINDWARA (M.P.)

P.G. College Campus Dharam Tekri, Chhindwara

75
आज़ादी का
अमृत महोत्सव

क्र. 25914 / अका. / रा.श.श.वि. / 2025

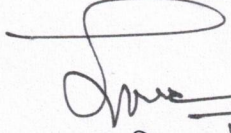
दिनांक 14/01/2025

// अधिसूचना //

सर्व संबंधितों को अधिसूचित किया जाता है कि सत्र 2024-25 में आयोजित पी-एच.डी. प्रवेश परीक्षा हेतु विभिन्न विषयों के पाठ्यक्रम निम्नानुसार होगा।

1. भाग "अ" – शोध प्रविधि (पाठ्यक्रम संलग्न है) सभी विषयों के परीक्षार्थियों हेतु अनिवार्य है।
2. भाग "ब" – हिन्दी साहित्य, अंग्रेजी साहित्य, अर्थशास्त्र, भूगोल, इतिहास, समाजशास्त्र, राजनीति शास्त्र, पुस्तकालय एवं सूचना प्रौद्योगिकी, भौतिक शास्त्र, रसायन शास्त्र, प्राणीशास्त्र, वनस्पति शास्त्र, वाणिज्य, संस्कृत, गणित एवं बायोटेक्नोलॉजी विषयों के पाठ्यक्रम मध्यप्रदेश राज्य पात्रता परीक्षा 2024 (MPSET 2024) के विषयवार पाठ्यक्रम अनुसार होगा। जिसमें निम्नांकित विषयों के परीक्षार्थी निम्नानुसार पाठ्यक्रम का अध्ययन करेंगे।

- रसायन शास्त्र के परीक्षार्थी के लिए केमिकल साइंस का पाठ्यक्रम मान्य है।
- वनस्पतिशास्त्र, प्राणीशास्त्र एवं बायोटेक्नोलॉजी के परीक्षार्थी के लिए लाईफ साइंस का पाठ्यक्रम मान्य है।
- भौतिक शास्त्र के परीक्षार्थी के लिए फिजिकल साइंस का पाठ्यक्रम मान्य है।

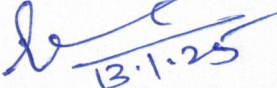

कुलसचिव 13.1.25

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प्रतिलिपि :-

- 1- आयुक्त उच्च शिक्षा विभाग सतपुड़ा भवन भोपाल की ओर सूचनार्थ।
- 2- माननीय कुलगुरु महोदय जी के निज सहायक के माध्यम से माननीय कुलगुरु महोदय जी की ओर सूचनार्थ।
- 3- संबंधित नस्ती।


13.1.25

प्रभारी अकादमिक

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पी-एच.डी. के लिए प्रवेश परीक्षा का पाठ्यक्रम
भाग – अ
शोध प्रविधि

- 1- शोध – अर्थ, प्रकार, प्रकृति, क्षेत्र और महत्व, अनुसंधान अभिकल्प।
- 2- वैज्ञानिक पद्धति एवं अनुसंधान के चरण एवं परिकल्पना।
- 3- प्राथमिक और द्वितीयक समंक – स्रोत, उपकरण और तकनीकें।
- 4- तथ्य संग्रह, प्रस्तुति, व्याख्या और विश्लेषण।
- 5- अनुसंधान में सांख्यिकीय उपकरण और तकनीकें।
- 6- आईसीटी का उपयोग – अनुसंधान में आईसीटी का अनुसंधान में मूल बातें और उसके अनुप्रयोग।
- 7- शिक्षण और अनुसंधान योग्यता- अवधारणाएं और महत्व, सीखने के दृष्टिकोण, धारणा और व्याख्या। अध्यापन कौशल।
- 8- अनुसंधान नीतिशास्त्र एवं वैज्ञानिक अनुसंधान में नैतिकता।

SYLLABUS FOR Ph.D. ENTRANCE EXAMINATION
PART-"A"
Research Methodology

- 1- Research - Meaning, types. Importance. Scope and nature. Research design.
- 2- Scientific Method & Stage of Research and Hypothesis.
- 3- Primary and secondary Data- Sources, Tools and techniques.
- 4- Data collection, presentation, interpretation and analysis.
- 5- Statistical tools & techniques in research
- 6- Use of ICT - Basics and applications of ICT in research
- 7- Teaching & Research Aptitude - concepts and importance, approaches of learning Perception and interpretation. Thing Skills.
- 8- Research Ethics and Morality in Scientific Research.

अंक विभाजन

- I. भाग – "अ" शोध प्रविधि (अंक 50) एवं भाग – "ब" संबंधित विषय से (अंक 50) कुल अंक 100
- II. प्रत्येक प्रश्न 01 अंक का होगा एवं ऋणात्मक मूल्यांकन नहीं होगा।
- III. सभी प्रश्न बहुविकल्पीय हैं।
- IV. समय : 02 घण्टे।

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Subject - Chemistry Part - B Syllabus

Inorganic Chemistry

1. Chemical periodicity
2. Structure and bonding in homo- and heteronuclear molecules, including shapes of molecules (VSEPR Theory).
3. Concepts of acids and bases, Hard-Soft acid base concept, Non-aqueous solvents.
4. Main group elements and their compounds: Allotropy, synthesis, structure and bonding, industrial importance of the compounds.
5. Transition elements and coordination compounds: structure, bonding theories, spectral and magnetic properties, reaction mechanisms.
6. Inner transition elements: spectral and magnetic properties, redox chemistry, analytical applications.
7. Organometallic compounds: synthesis, bonding and structure, and reactivity. Organometallics in homogeneous catalysis.
8. Cages and metal clusters.
9. Analytical chemistry- separation, spectroscopic, electro- and thermoanalytical methods.
10. Bioinorganic chemistry: photosystems, porphyrins, metalloenzymes, oxygen transport, electron-transfer reactions; nitrogen fixation, metal complexes in medicine.
11. Characterisation of inorganic compounds by IR, Raman, NMR, EPR, Mössbauer, UV-vis, NQR, MS, electron spectroscopy and microscopic techniques.
12. Nuclear chemistry: nuclear reactions, fission and fusion, radio-analytical techniques and activation analysis.

Physical Chemistry:

1. Basic principles of quantum mechanics: Postulates; operator algebra; exactly-solvable systems: particle-in-a-box, harmonic oscillator and the hydrogen atom, including shapes of atomic orbitals; orbital and spin angular momenta; tunneling.
2. Approximate methods of quantum mechanics: Variational principle; perturbation theory up to second order in energy; applications.
3. Atomic structure and spectroscopy; term symbols; many-electron systems and antisymmetry principle.
4. Chemical bonding in diatomics; elementary concepts of MO and VB theories; Huckel theory for conjugated π -electron systems.
5. Chemical applications of group theory; symmetry elements; point groups; character tables; selection rules.

6. Molecular spectroscopy: Rotational and vibrational spectra of diatomic molecules; electronic spectra; IR and Raman activities – selection rules; basic principles of magnetic resonance.
7. Chemical thermodynamics: Laws, state and path functions and their applications; thermodynamic description of various types of processes; Maxwell's relations; spontaneity and equilibria; temperature and pressure dependence of thermodynamic quantities; Le Chatelier principle; elementary description of phase transitions; phase equilibria and phase rule; thermodynamics of ideal and non-ideal gases, and solutions.
8. Statistical thermodynamics: Boltzmann distribution; kinetic theory of gases; partition functions and their relation to thermodynamic quantities – calculations for model systems.
9. Electrochemistry: Nernst equation, redox systems, electrochemical cells; Debye-Huckel theory; electrolytic conductance – Kohlrausch's law and its applications; ionic equilibria; conductometric and potentiometric titrations.
10. Chemical kinetics: Empirical rate laws and temperature dependence; complex reactions; steady state approximation; determination of reaction mechanisms; collision and transition state theories of rate constants; unimolecular reactions; enzyme kinetics; salt effects; homogeneous catalysis; photochemical reactions.
11. Colloids and surfaces: Stability and properties of colloids; isotherms and surface area; heterogeneous catalysis.
12. Solid state: Crystal structures; Bragg's law and applications; band structure of solids.
13. Polymer chemistry: Molar masses; kinetics of polymerization.
14. Data analysis: Mean and standard deviation; absolute and relative errors; linear regression; covariance and correlation coefficient.

Organic Chemistry

1. IUPAC nomenclature of organic molecules including regio- and stereoisomers.
2. Principles of stereochemistry: Configurational and conformational isomerism in acyclic and cyclic compounds; stereogenicity, stereoselectivity, enantioselectivity, diastereoselectivity and asymmetric induction.
3. Aromaticity: Benzenoid and non-benzenoid compounds – generation and reactions.
4. Organic reactive intermediates: Generation, stability and reactivity of carbocations, carbanions, free radicals, carbenes, benzyne and nitrenes.

5. Organic reaction mechanisms involving addition, elimination and substitution reactions with electrophilic, nucleophilic or radical species. Determination of reaction pathways.
6. Common named reactions and rearrangements – applications in organic synthesis.
7. Organic transformations and reagents: Functional group interconversion including oxidations and reductions; common catalysts and reagents (organic, inorganic, organometallic and enzymatic). Chemo, regio and stereoselective transformations.
8. Concepts in organic synthesis: Retrosynthesis, disconnection, synthons, linear and convergent synthesis, umpolung of reactivity and protecting groups.
9. Asymmetric synthesis: Chiral auxiliaries, methods of asymmetric induction – substrate, reagent and catalyst controlled reactions; determination of enantiomeric and diastereomeric excess; enantio-discrimination. Resolution – optical and kinetic.
10. Pericyclic reactions – electrocycelisation, cycloaddition, sigmatropic rearrangements and other related concerted reactions. Principles and applications of photochemical reactions in organic chemistry.
11. Synthesis and reactivity of common heterocyclic compounds containing one or two heteroatoms (O, N, S).
12. Chemistry of natural products: Carbohydrates, proteins and peptides, fatty acids, nucleic acids, terpenes, steroids and alkaloids. Biogenesis of terpenoids and alkaloids.
13. Structure determination of organic compounds by IR, UV-Vis, ^1H & ^{13}C NMR and Mass spectroscopic techniques.

Interdisciplinary topics

1. Chemistry in nanoscience and technology.
2. Catalysis and green chemistry.
3. Medicinal chemistry.
4. Supramolecular chemistry.
5. Environmental chemistry.