NATIONAL INSTITUTE OF PHARMACEUTICAL EDUCATION AND RESEARCH, RAEBARELI

(An Autonomous Institute under Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers, Government of India)

Transit Campus of NIPER Raebareli, Bijnor - Sisendi Road, PO- Mati,Sarojini Nagar, Lucknow (UP) - 226002

Phone: 0522-2497903 Web: www.niperraebareli.edu.in

Syllabus For Non Teaching Post

The Institute vide its Advertisement No. NIPER-R/Recruit/01/2019-20 dated 17th August, 2020 advertised various Non-Teaching Positions to be filled on direct recruitment basis.
With reference to above, the information related to Pattern of Written Examination, Syllabus, Total Marks, etc. for various Non-Teaching Positions is given below for information of all concerned.

NAME OF THE POST: Scientist/Technical Supervisor Grade –I

Written Examination shall consist Two Objective Type Papers each comprising 100 Multiple Choice Questions (MCQs) as detailed below:

Paper	Subject	Number of Questions	Maximum Marks	Duration
Paper I	General English, Numerical Aptitude, Reasoning and General Knowledge	30	30	2 hrs
Paper II	Domain Knowledge As per Syllabus	70	70	

In addition to the above written test, the candidates for the post of Scientist/Technical Supervisor Grade –I shall have to appear in the Skill Test as detailed below:

Name of the Skill Test	Duration	Maximum Marks
Skill Test	60 Minutes	25

Syllabus for the post of Scientist/Technical Supervisor Grade –I:
Paper-I

General Awareness

- Indian Constitution, Indian Economy, Culture, Indian Polity, Abbreviations, Personalities in News, Science & Technology, India Geography, History, Awards & Honors, Important Financial & Economic News, General Politics, Books & Authors, Inventions & Discoveries Science, Important Days, Sports & Games, Current Events

General English

- Grammar, Articles, Fill in the Blanks, Error Correction, Comprehension, Sentence Rearrangement, Synonyms, Vocabulary, Antonyms, Verbs, Tenses, Adverbs, Unseen Passages, Idioms & Phrases, Subject-Verb Agreement

Numerical Ability

- Ages Problems, Number Systems, Time & Distance, Percentages, Pipes & Cisterns, Averages, Data Interpretation, Boats & Streams, Time & Work, Discounts, Mixture and Allegation, Ratio & Proportion, Profit & Loss, H.C.F. & L.C.M, Simple & Compound Interest

Reasoning

- Arithmetical Reasoning, Embedded Figures, Cubes & Dice, Coding-Decoding, Alphabet Series, Number Series, Number Ranking, Mirror Images, Non-Verbal Series, Clocks & Calendars, Decision Making, Blood Relations, Directions, Analogy

General English: Questions in this component will be designed to test the Candidate's understanding and knowledge of English Language like Error recognition, Fill in the blanks (using verbs, preposition, articles etc.), One word substitution, Improvement of Sentences, Vocabulary, Spellings, Grammar, Sentence Structure, Synonyms, Antonyms, Sentence Completion, Phrases and Idiomatic use of words, Comprehension of Passages, as may be expected of a well-educated person who has not made a special study of the subject.

Numerical Aptitude & Reasoning: The questions will be designed to test the ability of appropriate use of numbers and number sense of the candidate. The scope of the test will be the computation of whole numbers, decimals and fractions and relationships between numbers. It will test sense of order among numbers, ability to translate form one name to another, sense or order of magnitude, estimation or prediction of the outcome of computation, selection of an appropriate operation for the solution of real life problems and knowledge of alternative computation procedures to find answers. The questions would also be based on arithmetical concepts and relationship between numbers and not on complicated arithmetical computation. On general reasoning, the candidates will be tested on reasoning and analytical abilities.
General Knowledge: Questions will be designed to General Knowledge viz., General Science, current events of national and international importance, History of India and Indian National Movement, India and World Geography, Indian Polity & Economy, General Mental Ability, NIPER Act & Statutes, Indian States, India and other countries.

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Paper-II

Structure,Energy, Thermodynamics, Interactions, Receptorology, Enzyme Kinetics, Enzyme Inhibition Nucleic acids, Drug likeness, Drug action after Metabolism, Ultra Violet (UV) and visible spectroscopy: Infrared (IR)spectroscopy, Nuclear Magnetic Resonance (NMR)spectroscopy, Mass spectrometry (MS)Organic reaction mechanism Principles of synthetic planning, Alkylation, Reaction of ylides, Hydroboration, Separation Techniques, Chromatography, Column Chromatography and Short Column Chromatography , Flash Chromatography and Vacuum Liquid Chromatography, High Performance Liquid Chromatography , Planar Chromatography, Counter Current Chromatography, Gas Chromatography Biochromatography, Hyphenated Techniques, Electronic Structure methods, Quantum chemical methods of analyzing drugs, Molecular modeling, Structure Activity Relationshipsin drug design QSAR, Molecular docking, Molecular dynamics, Pharmacophore concept, De Novo drug design techniques, Informatics methods in drug design, Metal/ammonia reduction, Reaction of electron-deficient intermediates, Umpolung and umpoledsythons, Asymmetric synthesis, Concerted reactions and photochemistry, Synthesis of complex molecules, Methods for the determination of structure of biomolecules, Properties of amino acids and peptide bond, Protein structure building block to quaternary structure of proteins, Structure of lipoproteins and glycoproteins in relation to their function. Structure of lipids, polysaccharides and carbohydrates, Detailed structure of nucleic acids and protein-nucleic acid interactions, Biological crystallography, Spectrofluorimetry and Optical methods:

Thermodynamical methods, Molecular isomerism, Chirality and molecular symmetry, Group theoretical interpretation of chirality group, Conformational analysis, Assignment of configuration, Front on projectional formula of conformers and configurational isomers. Resolution procedures, Chirality and drug action

Preformulation studies Role of pre-formulation in drug discovery, Role of preformulation in drug development, Salt selection

Solubilization,ADME, concentration time profile, plotting the data, different fluid compartments and blood flow rate compartment models, biological half life, elimination rate constant. Biopharmaceutics and pharmacokinetics in drug research.

GIT Absorption of drugs, Drug disposition, Protein and tissue binding, Bioavailability and bioequivalence

Pharmacokinetic characterization of drugs, Dosage regimen, Non Linear Pharmacokinetics, Physiologic pharmacokinetics models, Chronopharmacokinetics, Drug toxicity and forensic pharmacokinetics, kinetics of maternal-fetal drug transfer, pharmacokinetics v/s pharmacological/ clinical response, metabolic kinetics, Complexation, Rheology, Micromeritics, Dissolution, International regulatory trends in pharmaceutical industry, Role of regulatory affairs department in pharmaceutical organization, Types of regulatory filings for pharmaceutical products

New drug applications, Chemistry, manufacturing and control (CMC)information in NDA, Hybrid NDA,Abbreviated New Drug applications (ANDAs), Paragraph IV certification ANDAs, ANDA with suitability petition, Traditional drug discovery vs rational drug discovery, Genomics in target discoverySystems and methods of molecular biology, Protein expression systems,Enzyme purification and assay:

Bioprocess technology, Bioprocess technology, Downstream process, Biotechnology in pharmaceutical industry, Statistics: Introduction, its role and uses. Probability, Sampling, Estimation and Hypothesis Testing, Experimental design and analysis of variance, Correlation and regression, Non-parametric tests Statistical techniques in pharmaceutics, Intellectual property, Trade related aspects of intellectual property rights, Nuts and bolts of patenting, copyright and trademark protection criteria for patentability, types of patents; Indian Patent Act, 1970; WTO and modifications under TRIPS

Technology development / transfer / commercialisation related aspects:Funding sources for commercialization of technology, Ethics and values in IP.Influence of drug properties and routes of drug administration on design of sustained and controlled release systems, Polymeric materials in controlled drug delivery, Biopharmaceutic and pharmacokinetic aspects of peroral Controlled Drug Delivery Systems, Peroral controlled release delivery, Parenteral drug delivery, Transdermal / skin drug delivery system, Implantable Therapeutics Systems, Proteins / peptides drug delivery systems, Controlled release formulations for alternate routes of administration, Regulatory approval pathways involved in controlled release formulations, Role of controlled release in veterinary formulations, Development of dosage forms, Design of materials and product specifications

Quality by design (QbD).Methods of optimization, Process analytical technology (PAT) and other control strategies for QbD, Pharmaceutical Packaging, Testing of packaging materials, Documentation protocols. Formulation additives, Improved tablet production, Tablet coating, Specialized tablets, Liquid and poly-disperse systems, Sterile products and admixtures, Drug Nano-crystals: Generation, Inhalation Products

Herbal Formulation Development, Fundamentals of targeted drug delivery, Chemical drug delivery systems, Targeted brain delivery, Targeted Tumor Delivery, Colloidal drug delivery systems, Overview of Specialized drug delivery systems, Stimuli responsive drug delivery systems, Miscellaneous targeting approaches Levels of solid state properties, Molecular level, Polymorphism, Crystallization process, Implications of polymorphism in pharmaceutical development, Role of amorphous state in drug delivery, Co-crystals Particulate level properties, Bulk level, Drug development cycles and stability testing, Drug stability testing guidelines, WHO vs. ICH drug stability testing guidelines, Specific discussion on following ICH guidelines, Stress testing and stability-indicating method development:Stability testing of phytopharmaceuticals, Stability test equipment, Stability testing for Shipping & Distribution: Stability testing during transport, Biotransformation of drugs, Enzymes responsible for bio-transformations, microsomal a non-microsomal mechanisms, Factors influencing enzyme induction and inhibition. Factors effecting drug metabolism.Drug metabolism in fetus and new born.Models of study drug metabolism. Dose-effect relationships.Excretion of drugs, biliary and fecal excretion.Adverse drug reactions and drug interactions; Toxic reactions, allergic reactions, indiosyncracy.Acute poisoning and its treatment Role of pharmacology in drug discovery General principles of pharmacological screening.Animal ethics, regulations for conducting animal experimentation.3 R's concept, alternatives to animal experimentations, Organs-on-chipsPharmacological screening models.Correlations between various animal models and human situations.

Correlation between in-vitro and in-vivo screens, Cell- based assay, CaCo-2 cell permeability assay. Single cell gel electrophoresis assay (COMET) assay, Zebrafish model to screen pharmaceutical molecules.Biochemical assays, Introduction to cell culture, role of genomic and proteomic techniques in the process of target identification in drug discovery, MALdiTof., microarray. High throughput screening and high content screening, transgenic animal model for drug screening .Specific use of reference drugs Interpretation of results Pharmacogenomics and Personal medicine.

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