Syllabus for Ph.D. Entrance Test (PET) 2026
Department of Industrial Microbiology

Part A: Research Methodology

S. No	Subject Area	Number of questions
1	Quantitative methods; Principles and Designs of Experiments; Tool Parametric and Non~parametric statistics. Probability, Chi square test, t-test, Confidence interval, Errors. Levels of significance, Regression and Correlation coefficient. Analysis of variance for one way and two way classifications; Multiple Comparisons – Least Significant Difference Test, Duncan's New Multiple Range Test; Factorial Analysis; Analysis of Covariance. Use of SPSS Scientific writing, types o citation, literature search, graphical abstracts, peer review. Research proposa and report writing, format and structure of research paper. Major researcl Institutes and funding agencies related to plant sciences. Databases an Research Metrics: Databases: Indexing databases, Citation database: web o Science, Scopus etc. Research Metrics: Impact factor of journal as per journa citation report, SNIP, SJR, IPP, Cite, Metrics: h-index, g-index, i1 index,altmetrics.	20
2	Scientific conduct: Ethics with respect to science and research, Intellectua honesty and research integrity, scientific misconduct: Falsification, Fabricatio and Plagiarism (FFP), Use of plagiarism software tools, Redundant publication duplicate and overlapping publication, Selective reporting an misrepresentation of data. Publication Ethics: definition, introduction and importance, best practices standard setting initiatives and guidelines: COPE, WAME, etc, conflict o interest, publication misconduct, definition concept, problems that lead t unethical behavior and vice-versa, types, Violation of publication Ethics Authorship and contributor ship, identification of publication misconduct complain and appeals, Predatory publisher and journals	20
3	Computer Applications: Introduction of MS-Word: The screen and it elements, Creating new documents, Writing and Simple Formatting, Pag layout, Table, Pictures and Graphics. Introduction of MS-Excel and Powe Point: Basics of MS-Excel, Perform calculation on data, Manage worksheet Analyze alternative data sets, Create and Manage slides, Insert and Manag Simple Graphics, Add sound and movements of slides. Introduction of Interne and email: How to create e-mail, E-mail- sending a message, E-mail- attachin a document, How to use internet in research work.	10

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Part B: Microbiology

S N0.	Subject area	Number of questions
1	Microbiological media, types, Sampling technique, sterilization technique, various methods for isolation of pure culture methods for measurement of microbial growth.Manipulation of environment, nutritional and genetic parameters	5
2	Basic staining techniques- Simple, Negative, Gram, Acid Fast and differentiatial staining technique. Chromatographic techniques – Gel filtration, ion exchange chromatography, hydrophobic interaction and reverse phase chromatography, affinity chromatography, gas chromatography, high performance liquid chromatography, fast protein liquid chromatography; Application in separation of proteins including enzymes.	5
3	Batch, fed-batch and continuous cultivation, sterile operations, design of experiment for bioprocess optimization, industrial synthetic biology, high throughput bioprocess design, bioseparation and downstream processing- membrane separation techniques, chromatographic separation techniques, water purification.	5
4	New methods for antimicrobials: Antimicrobial Discovery and Developments: Antimicrobials and their usage in human medicine, veterinary, and plant/animal agriculture.	5
5	Maintenance and preservation of microbes (pure culture), BOD incubator , lyophilization and sterilization techniques.	5
6	Microscopy- Bright field, Dark field, Fluorescence. High performance liquid chromatography, Electrophoresis, SDSPAGE, isoelectric focusing. PCR, RAPD, RFLP- Differential and density gradient centrifugation. Separation of DNA/RNA using ultra centrifugation technique	5
7	Biochemical tests: Durham Tubes sugar fermentation, Methyl Red, VogesProskauer, Catalase, Oxidase, Nitrate reduction, Starch hydrolysis, Casein hydrolysis, Gelatin hydrolysis, Urea hydrolysis, Indole test, Citrate utilization, Phenylalanine deaminase, Decarboxylase, Litmus milk reaction	5
8	Basics of Electrophoretic and centrifugation techniques –DNA and plasmid isolation, PCR, types and uses. Agarose Gelelectrophoresis technique, moleculàr markers	5
9	Quantitative methods; Principles and Designs of Experiments; Tools Parametric and Non~parametric statistics. Probability, Chi square test, t-test, Confidence interval, Errors. Levels of significance, Regression and Correlation coefficient.	5

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10	Analysis of variance for one way and two way classifications; Multiple Comparisons – Least Significant Difference Test, Duncan's New Multiple Range Test; Factorial Analysis; Analysis of Covariance. Bioinformatic tools , evolutionary study , computational analysis of biological samples, GenBank submission , phylogeny constructions	

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PROF. ANIL KUMAR DWIVEDI
HEAD
DEPARTMENT OF BOTANY
D.D.U. GORAKHPUR UNIVERSITY
GORAKHPUR-273009