

**DEPARTMENT OF ENVIRONMENTAL SCIENCES
MAHARSHI DAYANAND UNIVERSITY ROHTAK**

Scheme of Examination of Pre.Ph.D. (Course Work) Examination

Paper No.	Nomenclature	Max.Marks	Internal assessment	Theory	Time
ENV-CW-I	Research methodology	100	20*	80	3 hrs
ENV-CW-II	Biostatistics and Computer applications	100	20*	80	3 hrs
ENV-CW-III	Tools and techniques in Environmental Sciences	100	20*	80	3 hrs

* Following will be criteria for the award of Internal Assessment:-

- a) Attendance : 5 Marks
Less than 65 % : 0 mark)
65 to 70 % : 2 marks) As per ordinance of PG Classes
71 to 75 % : 3 marks)
76 to 80 % : 4 marks)
Above 80% : 5 marks)
- b) Assignment/Presentation : 5 Marks
- c) Written Test : 10 marks

Pass percentage i.e. 50% in each paper has already been given in Ph.D. Ordinance.

Head, Deptt.of Environmental Sciences

Syllabus for Pre Ph.D. Course Work in Environmental Sciences

ENV-CW-I: RESEARCH METHODOLOGY

Max. Marks : 80

Time : 3 Hours

Note

1. Nine questions will be set in all.
2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, one question from each section.

UNIT I

Meaning of Research in Biological Sciences - Purpose, Characteristics and Types of Research - Process of Research -Formulation of objectives - Formulation of Hypotheses - Types of Hypotheses - Methods of testing Hypotheses - Research plan and its components - Methods of Research (Survey, Observation, case study, experimental, historical and comparative methods) - Difficulties in Biological research.

UNIT II

Identification and formation of research problem (Hypothesis). Elements in research methodology: Research design (CRD, RBD, LSD). Scientific database: Science Direct and Pubmed.

UNIT III

Ethical, legal, social and scientific issues in Biological Research. A brief idea about the funding agencies such as DST, DBT, ICMR, CSIR and UGC. Role of IPR in Research and Development.

UNIT IV

Writing of Research Proposal, Report and Research Paper: Meaning and types - Stages in preparation - Characteristics - Structure - Documentation: Footnotes and Bibliography - Editing the final draft-Evaluating the final draft- Checklist for a good proposal/report/research paper.Basic knowledge of organizing conferences, symposia, workshop, exhibition etc.

Books Recommended:

- Research Methodology- G.R. Basotia and K.K. Sharma.
- Research Methodology- C.H. Chaudhary, RBSA Publication

ENV-CW-II : BIOSTATISTICS AND COMPUTER APPLICATIONS

Max. Marks : 80

Time : 3 Hours.

Note

1. Nine questions will be set in all.
2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, one question from each section.

UNIT - I

Measurement of central tendency - mean (Geometric and Harmonic), median, mode, Measurement of dispersion moments, standard deviation, skewness and kurtosis. Correlation and linear regression of one independent variable, Basic laws and concepts of probability

UNIT - II

Definition of random variable, density function, Basic concepts of binomial and normal distributions. Sampling measurement and distribution of attributes. Moments, matrices and simultaneous linear equations, tests of hypothesis and significance.

UNIT - III

Analysis of Variance: Meaning of analysis of variance with linear models. Analysis of variance for one-way classified data, analysis of variance for two-way classified data with one observations for cell, analysis of variance for two-way classified data with multiple but equal number of observation per cell (data analysis only).

UNIT - IV

Computer Basics : Course introduction, MS Windows basics, File management, E-mail (PINE, EUDORA, Internet mail), File Transfer (ftp, WSftp).

Office Applications : MS Office 2000/XP including MS Word, MS Excel, MS PowerPoint.

References

- Elements of Biostatistics in Health Science- W. Daniell.
- Statistical Methods for Research: S. Singh et al (1988) Central Publishing Ludhiana.
- Fundamental of Statistics – D. N. Enhance.
- Statistical Methods: S.P. Gupta. S. Chand Publication
- Fundamentals of Biostatistics- Khan and Khanna, Ukaz Publication
- Biostatistical analysis- Zerold and Jar.

ENV-CW-III : TOOLS AND TECHNIQUES IN ENVIRONMENTAL SCIENCES

Max. Marks : 80

Time : 3 Hours.

Note : 1. Nine questions will be set in all.

2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, one question from each section.

Unit - I

Principles and application of Spectrophotometry (UV-Visible spectrophotometry), Titrimetry, Gravimetry, Colourimetry, NMR, ESR, Microscopy-phase, light and fluorescence microscopes, Scanning and Transmission electron microscopes, Autoradiography, solid and liquid scintillation, Ultracentrifugation.

Unit - 2

Chromatographic techniques (Paper chromatography, thin layer chromatography, ion exchange chromatography, Column chromatography). Gas-liquid chromatography, High pressure liquid chromatography, Atomic absorption spectrophotometry, cytophotometry and flow cytometry, Fixation and staining. Electrophoresis, X-ray fluorescence, X-ray diffraction. Flame photometry.

Unit – 3

Fundamentals of Biotechnology: Isolation and purification of DNA. Commonly used vectors for gene-cloning and construction of gene libraries. Enzymes, reagents and strategies used in gene-cloning. The techniques of DNA hybridization. Expression of genes in new hosts. Nucleotide sequence analysis of DNA. DNA-probes as detection methods. DNA amplification by Polymerase Chain Reaction.

Unit- 4

Use of DNA probes for low-level detection of living matter in environmental samples. DNA-based taxonomy in the assessment of biodiversity. Cloning of useful gene products related to microbial degradation of waste products.

Application of Biotechnology in Environmental Science- Use of engineered microbes in leaching of metals from ores, detoxification of industrial wastes, production of ethanol. Potential use of biotechnology in problems of soil reclamation and biological nitrogen fixation.

References :

1. Principles of Biophysical chemistry - Uppadahay -Uppadahay - and Nath.
2. Analytical Techniques - S.K. Sahani