DEPARTMENT OF BOTANY
MAHARSHI DAYANAND UNIVERSITY, ROHTAK

Scheme of Examination of Pre-PhD (Course Work) Examination

Paper no	Nomenclature	Max Marks	Internal assessment	Theory	Time
BOT-CW-I	Research methodology	100	20*	80	3Hrs
BOT-CW-II	Tools and Techniques	100	20*	80	3Hrs
BOT-CW-III	Advances in Plant Sciences	100	20*	80	3Hrs

* 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

Head, Deptt. of Botany

DEPARTMENT OF BOTANY
MAHARSHI DAYANAND UNIVERSITY, ROHTAK

SYLLABUS OF COURSE WORK FOR Ph.D.

BOT-CW-I: RESEARCH METHODOLOGY

Instructions for paper setter

There will be a total of nine questions. Question No. 1 will be compulsory and shall contain short answer type questions without any internal choice and it shall cover the entire syllabus. The remaining eight questions will include two questions from each unit. Candidates will be required to attempt one question from each unit-. They will attempt five questions in all.

Max. Marks: 80
Time: 3 Hrs.

UNIT I

Research Methodology: Meaning of Research in Biological Sciences; Characteristics of Research, Research student and research supervisor; Process of research; Identification and criteria of selecting a research problem (Hypothesis); Formulation of objectives; Research plan and its components; Methods of Research and Difficulties in Biological research;

UNIT II

Research Proposal and experimental design: Key elements- Objective, Introduction, Design or Rationale of work, Guidelines for design of experiments, Material and methods, Designing biological experiments, Compilation and documentation of data; Major research institutes related to plant sciences in India. A brief idea about government research agencies such as DBT, DST, ICMR, CSIR and UGC.

UNIT III

Writing and presentation: Format of research paper and report writing, Procedure of Reference Citation; Significance of writing research papers and review articles; Major scientific publishers; Impact factor and citation index; Ethical issues in research; Intellectual Property right and Plagiarism; Effective presentation of research findings.

UNIT IV

Statistical applications: Standard deviation, Standard error, Co-efficient of variation, probability distributions: Binomial, Poisson and Normal Distributions (areas method only) including problems. Sample statistics and parameters, population null hypothesis, level of significance. Definitions and applications of Chi-square test, 't' and 'f' test. Analysis of variance with linear models. Analysis of variance for one-way and two way classified data.

Books Recommended

1. Research Methodology- G.R. Basotia and K.K. Sharma.
2. Research Methodology- C.H. Chaudhary, RBSA Publication
3. Research Methodology: An Introduction - Wayne Goddard & Stuart Melville
4. Research Methodology - Ranjit Kumar
5. Research Methodology: Methods & Techniques - Kothari, C.R.

BOT-CW-II: Tools and Techniques

Instructions for paper setter

There will be a total of nine questions. Question No. 1 will be compulsory and shall contain short answer type questions without any internal choice and it shall cover the entire syllabus. The remaining eight questions will include two questions from each unit. Candidates will be required to attempt one question from each unit. They will attempt five questions in all.

Max. Marks: 80
Time: 3 Hrs.

Unit-I

Bioseparation techniques: Principle & application of gel filtration, ion exchange & hydrophobic interaction chromatography, thin layer chromatography, gas chromatography; High pressure liquid chromatography (HPLC), Fast Protein Liquid Chromatography, Electrophoresis (agarose and page); Isoelectric-focussing (IEF); Ultracentrifugation (Velocity and buoyant density).

Unit – II

Gene cloning: Isolation and Purification of DNA from living cells total cell, Plasmid DNAs , Polymerase Chain Reaction for DNA amplification, RT-PCR, cloning PCR or AFLP product after electrophoresis, pulse field electrophoresis for separation of large DNA molecules, Introduction of DNA in to the host cells and selection, Principles & technique of nucleic acid hybridization & cot curve, sequencing of nucleic acid, Southern, Northern, & Western blotting techniques

Unit - III

Techniques in Field Botany

Plant identification: International code of Botanical Nomenclature: Salient features, important rules and recommendation; Identification keys; Herbarium Methodology: Collection, poisoning, drying and preservation of herbarium specimens, Important National and International herbaria; Ethnobotanical survey techniques.

Unit – IV

Computer applications: MS Office. Popular image formats. Scientific literature databases: Science direct and Pubmed. Primary databases: Gene bank, EMBL, DDBJ, Swiss Prot, PIR and MIPS. Sequence comparison with BLAST, FASTA and CLUSTAL-W. Motif analysis and presentation with PROSITE and PRINTS.

Suggested Books:

1. Molecular cloning A Laboratory Manual 3rd edition Vol. 1, 2, 3- Sambrook and Russell, Churchill press, 2007
2. Principals and Techniques of Biochemistry and Molecular Biology, Edited by Keith Wilson and John Walker, Sixth Edition, Cambridge University Press.
3. Brown.T.A. (1995).Gene Cloning an Introduction.(3rd edition).Chapman Hall, 2-6 Bundary Row, U.K.

BOT-CW-III: ADVANCES IN PLANT SCIENCES

Instructions for paper setter

There will be a total of nine questions. Question No. 1 will be compulsory and shall contain short answer type questions without any internal choice and it shall cover the entire syllabus. The remaining eight questions will include two questions from each unit. Candidates will be required to attempt one question from each unit. They will attempt five questions in all.

Max. Marks: 80
Time: 3 Hrs.

UNIT I

Biodiversity: Introduction, estimation, distribution, significance, causes of depletion and conservation strategies; Biodiversity hot spots; Impact of climate change on biodiversity; Biodiversity and biotechnology relationship; Biopiracy and intellectual property rights; Organizations involved in biodiversity conservation; Indian Biodiversity Act (2002)

UNIT II

Molecular Biology: Role of engineering in stress tolerance, Kinds of molecular markers- Proteins markers , Isozyme markers and DNA markers, advantages, disadvantages & applications of molecular markers in the field of molecular biology, Relationship among different molecular markers. Cry genes- classification and properties, *Bacillus thuringenesis* endotoxin and their mode of action, Advantages of molecular markers in transgenic crops.

UNIT III

Stress Physiology: Physiological Effects and Mechanism of action of Auxins, Gibberellins ,Cytokinins, Abscisic acid,Polyamines and Salicylic acid Water deficit and its physiological consequences, drought tolerance mechanisms, salinity stress and plant responses, heat stress and heat shock proteins, metal toxicity, pollution stress. biotic stress , HR and SAR mechanisms. biotechnological approaches for stress tolerance in plants.

UNIT IV

Enzyme Technology: Introduction to enzymes, specificity of enzyme action, kinetic and chemical mechanisms of enzyme – catalyzed reactions, enzyme inhibition, active site structure, enzyme assay, application of enzymatic analysis in agriculture, environment, medicine and forensic science and industry. Stability, denaturation and renaturation of enzymes, immobilized enzymes and their uses, Biosensors. Recent advances in enzyme technology, future prospects for enzyme technology.

Suggested Books:

1. Enzyme Technology by Martin Chaplin and Christopher Bucke (1990) Cambridge University Press.
2. Biocatalysts and Enzyme Technology by Klaus Buchholz , Volker Kasche, Uwe Theo Bornscheuer (2005), 1 edition, Wiley-VCH.
4. Enzyme Technology, edited by Ashok Pandey, Colin Webb and Carlos icardo Soccol (2006), Springer US.
5. Introduction to plant physiology by W.G.Hopkins and NPA Huner, Wiley Int.3rd Ed. 2
6. Old and Primrose (1984).Principles of gene manipulation. Blackwell
7. Patterson, 1996. Genome mapping in plants, Academic Press.330p
8. Weising,K.,H.Nybom, K.Wolff, W. Meyere.1995. DNA Fingerprinting.CRL Press