

Dr. D. Y. Patil Vidyapeeth, Pune
Pattern for Pre-Ph. D. Examination for the faculties of
Medicine, Dentistry, Biotechnology & Bioinformatics, Nursing, Allied Medical Science
(Physiotherapy), Ayurved, Homoeopathic

Paper I	Research Methodology & Biostatistics No of total Questions - 10 (5 Questions on Research Methodology and 5 Questions on Biostatistics) Each Questions carries 5 marks	Total Marks - 50
Paper II	Recent advances in the concerned speciality No of total Questions - 10 Each Questions carries 5 marks	Total Marks - 50
Paper III	Presentation & Discussion (Relevant to the Research topic for Ph. D.)	Total Marks - 50

Dr. D. Y. Patil Vidyapeeth, Pune
Pre-Ph.D. Course Syllabus- Biotechnology and Bioinformatics
Structure of Pre-Ph.D. Course Work for Biotechnology and Bioinformatics

Sr. No.	Paper	Title	Marks
1	I	Research Methodology and Biostatistics	50
2	II	Recent advances in concerned specialty	50
3	III	Presentation and discussion	50
		TOTAL	150

Paper-I Research Methodology and Biostatistics

50 Marks

S. N.	Topic	Sub topic	Contact Hours
1.	Introduction, Hypothesis and preparation of a research proposal	Research: Objective, Motivation and Significance Defining the research problem Selecting the problem What is hypothesis Research hypothesis and Null hypothesis Literature survey and preparation of research proposal	04
2.	Methods of data and information collection	Collection of primary data Collection of secondary data Selection of appropriate method for data collection	03
3.	Experimental designs	Design of experiments, completely randomized and randomized block design. Factorial experiments and graphical interpretations Technique Modelling and simulation	04
4.	Scientific writing and publication	Interpretation, technical Report writing and presentation (oral/poster), Overhead projector powerpoint slides, Journal selection, Impact factor	03
5.	How to conduct field survey	Sampling fundamentals Important sampling distributions	01
6.	Processing and analysis of data	Basic statistical techniques Mean, Median, Mode etc. Analysis of variance, Chi-square test, ANOVA standard deviations, F- and t-test. Tabular and graphical presentation of data, Histogram, frequency polygon, pie chart. Parametric and Non parametric tests	06
7.	Measurement and scaling technique	Refining Skills in Regression Analysis Advanced Multivariate Analysis	03
8.	Sampling errors	Theory of errors Errors and residuals, precision, measure of precision, Probable error of function, rejection of observation, DEA technique for decision making	03
9.	Computer aided statistical Analysis	Common software available, Internet applications, database and bioinformatics. Use of statistical software packages	03

Paper II: Recent advances in concerned speciality**50 Marks**

Sr. No.	Topic	Details	Contact hours
1	Basics of Animal Cell Culture	Equipments, culture vessels, minimal requirements of cell cultures, sterilization techniques, biohazards, bioethics, validations, preservation and maintenance of cell lines.	02
2	Cultural Media and characterization of cells	Physico-chemical properties of media, media constituents, selection of medium Characterization of cultured cells, measurement of growth parameters of cultured cells, types of primary cells, cell lines	03
3	Immunobiotechnology	T cells, B cells, Antigen and antibody structure - Humoral and cell-mediated immune responses, Complement system, Cytokines - T cell and B cell epitope mapping - Activation of T cell and B cell, MHC I and II, APCs - Measurement of antigen and antibody reaction - Vaccines: History, key principles of vaccinology, herd immunity, adjuvants, type of adjuvants, function of adjuvants, classification of vaccines, type of vaccines	04
4	Introduction to plant biotechnology	Basic Techniques in tissue culture, plant molecular biology and rDNA Technology.	02
5	Plant Tissue Culture	Introduction to plant Tissue Culture, Tissue culture media composition and preparation, callus and suspension culture, organ culture, regeneration of plants, Micropropagation and production of virus-free plants, techniques of cryopreservation and applications of germplasm storage	03
6	In vitro hybridization	Protoplast isolation, culture and fusion - selection of somatic hybrid cells and regeneration of hybrid plants, cybrids	02
7	Advances in bacterial taxonomy	Polyphasic taxonomy, phylogenetic backbone & Taxonomic framework Morphological, Physiological, Chemotaxonomic, Biochemical and Molecular approaches in identification	02
8	Advances in Microscopy and microscopic techniques	Bright field optics and microscopy, Phase contrast and dark field principles and applications, Fluorescence microscopy and advanced Confocal imaging systems, Scanning Electron microscopy and attachments for multiple applications, Transmission Electron Microscopy and attachments for multiple applications, Atomic Force Microscopy	03
9	Metagenomics, Molecular techniques in cloning and gene expression	Culture independent studies DNA isolation techniques Cloning strategies DNA sequencing – manual & automated methods Hybridization, RAPD, AFLP, DGGE, etc	04
10	Biochemical techniques	Harvesting intracellular/extracellular proteins Enzyme activity and specific activity determination Concentration and Purification of proteins/enzymes (Chromatographic techniques) Characterization of proteins/enzymes Electrophoresis (PAGE, SDS-PAGE, 2D, isoelectric focusing, immunoelectrophoresis, western blotting, capillary electrophoresis, pulse field gel electrophoresis, etc) NMR, FTIR, MALDI-TOF, etc	04
11	Biological Databases and Sequence Alignment	Sequence Database (EMBI, GenBank, DDBJ) Structural Database (CATH, SCOP, PDB) Pairwise Sequence Alignment & Multiple Sequence Alignment	03
12	Drug Designing Techniques	QSAR, Pharmacophore, Homology Modeling, Docking	02

Paper III: Presentation and Discussion

50 Marks

The presentation of the Research topic by the candidate will be evaluated by an Expert Committee. The candidate will be required to make a presentation under the following headings —

- (1) Need for Selection of the topic.
- (2) Aims & Objectives
- (3) Current Scenario (In relation to topic of research)
- (4) Detail study plan
- (5) Evaluation Parameters
- (6) Expected impact of study / Implications

He/She will also be required to provide a brief report (10 sets) of the contents of the presentation (not exceeding 10 pages) to the members of the Committee.

The Expert Committee will be constituted by the Vice-Chancellor on the recommendations of the Dean of the concerned faculty.

Evaluation:

Sr. No.	Paper	Title	Marks
1	I	Research Methodology and Biostatistics	50
2	II	Recent Advances in concerned speciality	50
3	III	Presentation and discussion	50
	Total Marks		150

*The student should obtain a minimum of 55% marks in order to be declared successful at the Pre-Ph.D. examination.