

**Pt. Ravishankar Shukla University, Raipur
(2016-2017)**

Master of Philosophy in Bioscience

The M. Phil. examination shall follow the following patterns:

Allotment of Marks

	Theory/ Lab Course		Marks
1.	Theory-I	Research Methodology, Advanced Tools & Techniques, Quantitative Data Analyses and Computer Fundamentals	100
2.	Theory-II	Modern Biology	100
3.	Theory-III		100
	OR		
	Lab Course-I		100
Total Marks			300
4.	Seminar	Based on theory	50
5.	Dissertation	Seminar based on dissertation	50
		Script Writing	75
		Viva-voce	25
Total Marks			200
Grand Total			500

- (b) The distribution of 100 marks of practical is as follows:
- | | |
|------------------|----|
| Practical | 60 |
| Viva-voce | 20 |
| Practical record | 20 |
- (c) The third theory course shall be applicable to the subjects that do not have lab courses.
- (d) The assessment of the Seminars shall be done by the internal examiners. The assessment of the practical records, carrying 20 marks shall be done at the time of the annual examination jointly by the internal and external examiners.
- (e) The result will be computed by combining the marks of the various courses and the dissertation.

Theory Paper I

Research Methodology, Advanced Tools & Techniques, Quantitative Data Analyses and Computer Fundamentals

Unit-I Research Methodology

Types of data, Data collection, Methods and tools of data collection
Introduction to research methodology: Scope
Research problem: Identification, Selection, Formulation of research objectives
Research design: Components, Importance, Typology
Research ethics, Institutional ethics committee for human and animal research
Plagiarism - Pitfall
Patents and IPR: Patent laws, process of patenting a research finding, Copy right, Cyber laws

Unit-II Advanced Tools & Techniques

Microscopic techniques –Electron microscopy and Confocal microscopy
Principle, protocol and application of Chromatography – GLC & HPLC,
Electrophoresis and its application
PCR, Real time PCR, DNA microarray, DNA sequencing
Protein microarray and Protein sequencing

Unit-III Quantitative Data Analyses

Hypothesis testing
Normal and Binomial distributions and their property
Tests of significance: Student *t*-test, *F*-test, *Chi-square* test
Correlation and Regression
ANOVA – One-way and Two-way, Multiple-range test

Unit-IV Computer Fundamentals

Introduction to spreadsheet application, features and functions,
Using formulas and functions, Data storing, Generating charts/ graph and other features. Tools used may be Microsoft Excel or any other comparable/similar tool.
Introduction to presentation tool, features and functions,
Creating presentation, Customizing presentation, Showing presentation. Tools used may be Microsoft Power Point or any other comparable/similar tool.
ICT: meaning, advantages and uses; Basics of internet, e-mailing, Search engine, like Google, Yahoo, MSN, Entrez including Pub med, Literature search techniques. Web of Science, Citation Index: Science Citation Index (SCI), h-index, i-10-index. Journal Impact Factor (JIF)
Features for Statistical data analysis using computers and software, Microsoft Excel Data Analysis Tool Pak, SPSS

Lab Course:

1. Construction of frequency distribution curves
2. Effect of size of class interval on the pattern of frequency distribution
3. Construction of cumulative frequency distributions
4. Computation of measures of central tendency and dispersion based upon grouped data and ungrouped data
5. Hypothesis testing: Exercises on *t*-test, *F*-test & χ^2 -test

6. Computation of correlation coefficient and regression constants
7. Data analyses using MS Excel ToolPak: Descriptive statistics, ANOVA, Correlation and Regression, *t*-test
8. Computation of correlation coefficient and regression constants using SPSS
9. Internet application with special reference to literature search
10. Performance of SDS-PAGE analysis
11. Study of isoenzyme pattern
12. Performance of RAPD analysis

Recommended Books:

Campbell RC	Statistics for biologists
Zar JH	Biostatistical Analysis
Wardlaw AC	Practical Statistics for Experimental Biologists
Snedecor GW & Cochran WG	Statistical Methods
Sokal RR & Rohlf FJ	Introduction to Biostatistics
Sumner M	Computers: Concepts & Uses
White R	How Computers Work
Cassel P <i>et al.</i>	Inside Microsoft Office Professional
Coleman P and Dyson P	Mastering Internets
Gralla P	How the Internet Works
Shelly GB, Vermaat ME, Cashman TJ	Microsoft® 2007: Introductory Concepts and Techniques
Habraken J	Microsoft® Office 2003 All in One
	Microsoft® Office 2010 In Depth
Gilmore B	Plagiarism: Why it happens, How to prevent it?
Buranen L and Roy AM	Perspectives on Plagiarism and Intellectual Property in a Post-Modern World
Kumar Anupa P	Cyber Law
Sood V	Cyber Law Simplified
Campbell RC	Statistics for biologists
Zar JH	Biostatistical Analysis
Wardlaw AC	Practical Statistics for Experimental Biologists
CR Kothari	Research Methodology: Methods & techniques, 2008
G Daigaku <i>et al.</i>	Molecular mechanism of biosignal transduction

Theory Paper II
Modern Biology

Unit-I Biosignaling

Molecular mechanism of signal transduction, Gated ion channels
Receptors enzymes; Insulin receptor, Guanyl cyclase
G- protein- coupled receptor and second messengers
Phosphorylation as a regulatory mechanism
Regulation of cell cycle by protein kinase
Quorum Sensing

Unit-II Immunotechnology

Organization of Immunoglobulin genes: Light & Heavy chain, variable & constant region.
Generation of antibody diversity: Light and heavy chain gene recombination, Heavy chain constant region genes, Class switching.
Membranous and secreted immunoglobulin.
Synthesis and production of immunoglobulin: Monoclonal antibody, Designer

antibody.

Antigens and antigenicity. Antigen-antibody interaction.

Immunodiagnosics: Precipitation reactions, Haemagglutination,

Immunofluorescence, Radio and Enzyme immuno assays, Immunoblotting.

Immunoprophylaxis: vaccines and vaccination.

Unit-III Plant Tissue Culture

Laboratory requirement and general techniques of plant tissue culture

Tissue culture media

Cell culture

Cellular totipotency, morphogenesis.

Somatic embryogenesis

Haploid production.

Protoplast isolation, culture and fusion.

Clonal propagation

Unit-IV Seed Technology

Seed storage: biochemical and molecular basis of viability and vigour tests

Testing Techniques for Seed storage behaviour: orthodox and non-orthodox

Seed age & ageing markers: Telomeres and telomerase. Seed priming technology.

Cryogenic storage biotechnology

Seed quality improvement: Seed Protein, Carbohydrate and Oil quality.

Seed Germination: Biochemical and molecular basis of germination methods, germination specific markers

Seed dormancy: Biochemical & molecular markers and hormonal control.

Seed testing: GM crops, Plant molecular farming.

Lab Course (8-10 exercises out of the list given below):

1. Determination of percent and rate of germination of seed
2. Determination of seed viability
3. Determination of level of electrolytic leakage in fresh and aged Moong seed
4. Determination of the rate of lipid peroxidation in fresh and aged seeds
5. Determination of Ag-Ab reaction through double diffusion technique
6. Determination of Ag-Ab reaction through counter current immunoelectrophoresis (CIEP)
7. Demonstration of Ag-Ab reaction through immunoelectrophoresis technique
8. Demonstration of the technique of radial immunodiffusion (RID)
9. Performance of sandwich DOT ELISA test for antigen
10. Study of Haemagglutination with the help of commercial kit
11. Preparation of Murashige and Skoog (MS) media
12. Performance of shoot-bud culture by explants in MS media
13. Multiplication of shoot induction in MS solid media
14. Multiplication of shoot induction in MS liquid media
15. Study of somatic embryogenesis using zygotic embryo of a given plant

Recommended Books:

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| MK Razdan | Introduction to Plant Tissue Culture, 2 nd Edition, Oxford & IBH Publishing Co. Pvt Ltd, 2010 |
| IK Vasil | Plant Cell and Tissue Culture; Springer Publication, 1994 |
| SS Bhojwani and MK Razdan | Plant Tissue Culture; Elsevier |
| TJ Fu, G Singh and WR Curtis | Plant Cell and Tissue Culture for the production of Food Ingredients. Kluwer Academic/ Plenum Press, 1999 |
| MK Razdan | Introduction to Plant Tissue Culture, 2 nd Edition, Oxford & IBH Publishing Co. Pvt Ltd, 2010 |

Leigninzer	Biochemistry
SS Bhojwani and MK Razdan	Plant Tissue Culture: Theory and Practice (1996)
JD Bewley & M Black	Physiology & Biochemistry of Seeds, Vol. I & II
JD Bewley & M Black	Seeds : Physiology of Development & Germination
Black <i>et al.</i>	Desiccation and Survival of Plants : Dying without Drying
PK Agrawal & M Dadlani	Techniques in Seed Science & Technology
FAO Report 113	Ex-situ storage of seeds, pollen & <i>in vitro</i> cultures
Copeland & McDonald	Seed Science & Technology
RL Agrawal	Seed Technology
J Kigel & G Galili	Seed Development & Germination
RA Goldsby <i>et al.</i>	Kuby's Immunology
E Benjamini <i>et al.</i>	Immunology-A short Course
Roitt, Brostoff and Male	Immunology
William Paul	Fundamentals of Immunology
Stewart Snell	Immunology, Immunopathology and Immunity
Elgert	Understanding Immune System
R Panneerselvam	Research Methodology
CR Kothari	Research Methodology: Methods & techniques, 2008
G Daigaku <i>et al.</i>	Molecular mechanism of biosignal transduction
M Kasai	Biosignal transduction mechanism