

BHAGWANT UNIVERSITY
Sikar Road, Ajmer
Rajasthan



Syllabus

Institute of Life Sciences & applied Sciences

M. Phil
(BIOCHEMISTRY)

ANNUAL SCHEME OF EXAMINATION:

1. Every candidate shall be required to offer three written papers and one dissertation (equivalent to one paper). Within this frame work the Board of Studies shall recommend the course of study for the M. Phil examination.
2. The course of study for the M. Phil degree shall extend over a period of one academic year. There shall be a continuous internal assessment and as external assessment. The proportion of internal and external assessment shall be 30:70. There will be no internal assessment in the dissertation. Total marks for M. Phil will be 400. Dissertation may be written by the candidates under the supervision of any teacher who is registered as M. Phil Supervisor. Supervisor can guide normally five dissertations. However, the maximum limit may be relaxed by the permission of Vice-Chancellor on the recommendation of Head. The internal Supervisor can guide five candidates and workload of six hours is admissible for each M. Phil course for dissertation. The Supervisor will sign and issue a certificate counter signed by the Head of department concerned.
3. The internal assessment may be evaluated on the basis of:
 - (a) Mid Terms : 15 Marks
 - (b) Assignments /Seminar Presentation /Group Discussion: 15 Marks
1. Each theory paper shall consist of 100 marks. The dissertation shall also consist of 100 marks. For a pass, a candidate shall be required to obtain (a) at least 40% marks in each paper separately (b) a minimum of 50% marks in the aggregate of all the papers prescribed for the examination. In the mark sheet, successful candidates shall be classified as under

First Division	65% or more.
Second Division	50-65%
- 6- A candidate will have to pass individually both in the Internal as well as external examination and it should be shown separately in the marks sheet.
- 7- The placement of every candidate under a Supervisor/Guide shall be decided within two months from the last date for admission.
- 8- A candidate who fails at the examination even in one paper/dissertation shall be required to reappear at the examination in a subsequent year in all the papers/dissertation prescribed for the examination, provided that a candidate who obtains at least 50% marks in dissertation shall be exempted from the submitting a fresh dissertation and the marks obtained by him shall be carried forward for working out his result.
- 9- For each theory paper 10 questions will be set for the final examination and the candidate will have to attempt at least five questions. All the questions will carry equal marks.
- 10- Workload distribution: There will be a teaching of four periods of one hour duration per week for each theory paper and six hours for dissertation.
i.e. 4X3 = 12 hours for theory papers and six hours for dissertation per week.

Papers Number	Paper Code	Papers Name	TEACHING PERIOD			External Marks	Internal		G. Total
			L	T	P		Mid Terms carrying 15 marks	Assignments /Seminar Presentation /Group Discussion	
Paper I	01MPL26101	Research methodology	3	1	0	70	15	15	100
Paper II	01MPL26102	Advances in Biochemistry	3	1	0	70	15	15	100
Paper III	01MPL26103	Fundamentals of Microbiology	3	1	0	70	15	15	100
Paper IV	01MPL26201	Seminar, Field work & Dissertation Writing	4	2	0	100	--	--	100
Total			13	5	0	310	45	45	400

Paper-I

Research methodology

Paper Code:
01MPL26101.

Unit-I

Fundamental Laboratory Techniques : Basic principles, Health and safety, working with liquids, Basic laboratory procedures I, Basic laboratory procedures II, Principles of solution chemistry, pH and buffer solutions (Ref. 1. Chapters 1 to 7 : pages 03 to 62)

The investigative approach : Making and recording measurements, SI units and their use, Scientific method and design of experiments, Project work (Ref. 1. Chapters 8 to 11 : pages 65 to 83)

Unit-II

Analysis and presentation data : Using graphs, Presenting data in tables, Hints for solving numerical problems, Descriptive statistics, choosing and using statistical tests, drawing chemical structures, chemometrics, computational chemistry (Ref. 1. Chapters 37 to 44 : pages 251 to 295)

Information technology and library resources : The Internet and World Wide Web, internet resources for chemistry, using spreadsheets, word processors, databases and

other packages, finding and citing information (Ref. 1. Chapters 45 to 49 : pages 299 to 321)

Unit-III

Communicating information : General aspects of scientific writing, writing essays, reporting practical and project work, writing literature surveys and reviews, organizing a poster display, giving an oral presentation examinations (Ref. 1. Chapters 50 to 56 : pages 325 to 354)

Unit-IV

Chemical safety and Disaster Management :

1. Emergency response : chemical spills, radiation spills, biohazard spills, leaking compressed gas cylinders, fires, medical emergency accident reporting

2. General safety : General safety and operational rules, safety equipments, personal protective equipments, compressed gas safety, safety practices for disposal of broken glass wares, centrifuge safety, treated biomedical wastes and scientific ethics.

3

Unit-V

Research problem : meaning of research problems, sources of research problems, criteria / characteristics of a good research problem, errors in selecting a research problem.

Hypothesis : Meaning, types of hypothesis.

Developing a Research Proposal : Format of research proposal, individual research proposal and institutional proposal.

Research Report : Format of the research report, style of writing the report, references and bibliography.

Books :

1. Practical Skills in Chemistry, J. R. Dean, A. M. Jones, D. Holmes, R. Reed, J. Weyers and A Jones, Pearson Education Ltd. [Prentice Hall] (2002)

2. OSU safety Manual 1.01.

3. Research Methodology. Methods and Techniques : Kothari, C. R.

4. Tests, Measurements and Research Methods in Behavioural Sciences : Singh, A. **Unit-I**

Paper-II

Advances in Biochemistry

Paper Code:

01MPL26102.

Unit -I

Microbial taxonomy: Approaches for identification up to species level (Principles and methods)

Advances in protein techniques (purification and characteristics)

Molecular diagnostic techniques for genetic disorders

Unit-II

Bioremediation: Microbial and phytoremediation.

Effluent analysis: Sample collection, storage, physico-chemical and biological methods of analysis.

Industrial enzymes: Amylase, protease, laccase, lipases.

Unit-III

Nanobiotechnology: Concept and applications

Secondary metabolites: Natural products, isolation, purification, characterization and applications (alkaloid, tannins, flavonoids)

Unit -IV

Nutraceuticals: Concept, types, sources, production and application.

Plant transformation methods including tissue culture, non tissue culture based, Agrobacterium mediated co-cultivation, plant vectors, particle bombardment.

Proteomics including recognition, sequencing, identification, differential analysis, identity, fading etc.

Unit V

Plant pathogens/ microbe/ insect interactions, plant defense proteins such as AI, PI, lectins, defensins, abiotic stress tolerance in plants.

Biotransformation reactions.

Signal transduction: Nerve cell structure, Synaptic transmission at nerve muscle and central synapse, secondary messengers mediated synaptic transmission.

Bioinformatics and database (protein and nucleotide)

Fermentation technology and Down stream processing

Reference:

1. Fundamentals of enzymology- Price and Stevens
2. Physical Biochemistry- Frifelder
3. Microbiology- Pelczar
4. Microbiology- Brock
5. Molecular Biology and Cell- Bruce Alberts
6. Principles and Techniques of Biochemistry- Wilson and Walker
7. Principles of neural sciences- Kandal, Schwartz
8. Principles of Toxicology- Casarett and Doull
9. Plant cell tissue and organ culture- Gambaz Phillips
10. Nutrition and Food processing- Miller
11. Principles of fermentation technology- Stanbary and Whitaker
12. Related Research and Review articles can also be referred

Paper-III

Paper Code:
01MPL26103.

Fundamentals of Microbiology

Unit I Morphology and ultra structure of bacteria;

Size, shape, and arrangement of microorganisms

- Ultrastructure of bacterial cell; cell wall, flagella, pilli, cell wall of Gram positive and Gram Negative bacteria.

- Introduction to bacterial classifications Unit IV

Characteristics of microorganisms.

- General characteristics and significance of

- Bacteria
- Fungi
- Algae
- Protozoa
- and Viruses.

Unit II.

Microbial growth and nutrition.

- Modes of cell division and reproduction in bacteria
- Growth rate, generation time, details of growth curve, mathematical expression for growth, continuous growth and synchronous growth.
- Measurement of growth: Determination of cell number, counting chamber, determination of cell mass

Unit III Cultivation of bacteria

- Nutritional classification of bacteria
- Concept of media and nutrition for bacteria, bacteriological media: types and preparation.
- Physical and chemical factors affecting the growth of microorganisms
- Concept of pure culture
- Isolation methods for bacteria.

Unit IV Microbial associations.

- Introduction to microbial associations with examples; Mutualism, Commensalisms, Parasitism, Synergism

Unit V Control of microorganisms.

- Rationale behind control of microorganisms
- Microbial control by physical methods: High temp., low temp, desiccation, Osmotic pressure and radiation.(UV, X Gamma rays), sterilization by filtrations
- Microbial control by chemicals methods: Major groups of antimicrobial agents (acids alkali alcohol heavy metals and detergents), characteristics of an ideal chemical agent, concept of antibiotics, phenol-coefficient method.

Referances:

General microbiology – stainer R.Y. Ingraham J.L. Wheelis M.L. painter P.R. the Macmillan press ltd, London. sixth edition.

Microbiology – Pelezer M.J. Jr.E.C.S. Chan, Tata McGraw Hill publishing company Ltd. New Delhi, Fifth edition.

Foundation of Microbiology – S. B. Chincholkar, A.B. Chaudhary Ulhas Patil, Nirali Publications, Third edition.

Brock Biology of Microorganism – Madigam M.T., Martinko J.M. and Parker J.K. , Prentice Hall Publication Eleventh edition.

Paper-IV

Seminar, Field work & Dissertation Writing

Paper Code:
01MPL26201.

1. **Seminar** : Seminar to be delivered on a relevant theme
 2. **Field Work** : Visit to industry/National institutes and interaction with experts. (Report to be submitted)
 3. **Review** : Preparation and submission of review article based on research papers addressing a contemporary research problem.
 4. **Other activities** : Attending National / International workshop / Symposium / Conferences or participation for oral / poster presentation or interaction with M.Sc. students for problem solving approaches / Work of Nobel laureates in last ten years in Science.
- Above topics shall be prepared in consultation with research guide

Each student will submit dissertation on any one topic related to biochemistry
Dissertation will be guided by supervisor of the university and will be examined by external.
