# GOVT. DIGVIJAY AUTONOMOUS P.G. COLLEGE

# RAJNANDGAON, C.G.



## SESSION 2021 – 2022

## SCHEME OF EXAMINATION

## &

## SYLLABUS

## OF

## M.Sc. (MICROBIOLOGY)

## UNDER

## FACULTY OF LIFE SCIENCES

**(Approved by Board of Studies)**

**Effective from July 2021**

## DEPARTMENT OF MICROBIOLOGY

## GOVT. DIGVIJAY AUTONOMOUS P.G. COLLEGE

## RAJNANDGAON, C.G.

## Govt. Digvijay Autonomous P.G. College, Rajnandgaon, C.G.
## M.Sc. Microbiology
## Scheme of Examination and Syllabus

**July 2021- December 2021**

| | Paper No. | Title of The Paper | Marks | | Total |
|---|---|---|---|---|---|
| | | | (External) | (Internal) | |
| FIRST SEMESTER | I | BACTERIOLOGY | 80 | 20 | 100 |
| | II | VIROLOGY | 80 | 20 | 100 |
| | III | PHYCOLOGY AND MYCOLOGY | 80 | 20 | 100 |
| | IV | FUNDAMENTALS OF IMMUNOLOGY | 80 | 20 | 100 |
| | LC-I | LAB COURSE I (Based on Paper I and II) | 100 | | 100 |
| | LC-II | LAB COURSE II (Based on Paper III and IV) | 100 | | 100 |
| | | | | TOTAL | 600 |

**January 2022 – June 2022**

| | Paper No. | Title of The Paper | Marks | | Total |
|---|---|---|---|---|---|
| | | | (External) | (Internal) | |
| SECOND SEMESTER | I | MOLECULAR BIOLOGY | 80 | 20 | 100 |
| | II | MICROBIAL GENETICS | 80 | 20 | 100 |
| | III | MICROBIAL PHYSIOLOGY | 80 | 20 | 100 |
| | IV | BIOSTATISTICS AND COMPUTER APPLICATION | 80 | 20 | 100 |
| | LC-I | LAB COURSE I (Based on Paper I and II) | 100 | | 100 |
| | LC-II | LAB COURSE II (Based on Paper III and IV) | 100 | | 100 |
| | | | | TOTAL | 600 |

**July 2021 – December 2021**

| | Paper No. | Title of The Paper | Marks | | Total |
|---|---|---|---|---|---|
| | | | (External) | (Internal) | |
| THIRD SEMESTER | I | CELLULAR MICROBIOLOGY | 80 | 20 | 100 |
| | II | MEDICAL MICROBIOLOGY | 80 | 20 | 100 |
| | III | FOOD AND DAIRY MICROBIOLOGY | 80 | 20 | 100 |
| | IV | INSTRUMENTATION AND TECHNIQUES | 80 | 20 | 100 |
| | LC-I | LAB COURSE I (Based on Paper I and II) | 100 | | 100 |
| | LC-II | LAB COURSE II (Based on Paper III and IV) | 100 | | 100 |
| | | | | TOTAL | 600 |

**January 2022–June2022**

| | Paper No. | Title of The Paper | Marks | | Total |
|---|---|---|---|---|---|
| | | | (External) | (Internal) | |
| FOURTH SEMESTER | I | ENVIRONMENTAL MICROBIOLOGY | 80 | 20 | 100 |
| | II | ENZYME TECHNOLOGY | 80 | 20 | 100 |
| | III | FERMENTATION &MICROBIAL TECHNOLOGY | 80 | 20 | 100 |
| | IV | PHARMACEUTICAL MICROBIOLOGY/AGRICULTURE MICROBIOLOGY | 80 | 20 | 100 |
| | LC-I | LAB COURSE I (Based on Paper I and II) | 100 | | 100 |
| | LC-II | LAB COURSE II (Based on Paper III and IV) | 100 | | 100 |
| | | | | TOTAL | 600 |

2021-22

**M.Sc. – MICROBIOLOGY, SEMESTER IV**

**Paper – IV – PHARMACEUTICAL MICROBIOLOGY M.M. – 80**

PMBCT–404

**Unit – 1**

Antibiotics and synthetic antimicrobial agents (Aminoglycosides, β-lactams, tetracyclines, ansamycins, macrolid antibiotics).

Antifungal antibiotics, antitumor substance. Peptide antibiotics, Chloramphenicol, Sulphonamides and Quinolinone antimicrobial agents.

Chemical disinfectants, antiseptics and preservatives.

**Unit – 2**

Mechanism of action of antibiotics (inhibitors of cell wall synthesis, nucleic acid and protein synthesis).

Molecular principles of drug targeting. Drug delivery system in gene therapy Bacterial resistance to antibiotics.

Mode of action of bacterial killing by quinolinones. Bacterial resistance to quionolinones.

Mode of action of non – antibiotic antimicrobial agents.

**Unit – 3**

Microbial contamination and spoilage of pharmaceutical products (sterile injectables, non-injectables, ophthalmic preparations and implants) and their sterilization.

New vaccine technology, DNA vaccines, synthetic peptide vaccines, multivalent subunit vaccines. Vaccine clinical trials.

**Unit – 4**

Financing R&D capital. Government regulatory practices and policies, FDA perspective.

Reimbursement of drugs and biologicals, legislative perspective. Rational drug design. Immobilization procedures for pharmaceutical applications (liposomes).

Biosensors in pharmaceuticals. Application of microbial enzymes in pharmaceuticals.

## Recommended Books

1. Pharmaceutical Microbiology – Edt. by W.B.Hugoand A.D. Russell Sixth edition. Blackwell scientific Publications.

2. Analytical Microbiology –Edt by Frederick Kavanagh Volume I and II. Academic Press New York.

3. Quinolinone antimicrobial agents – Edt. by David C. Hooper, John S. Wolfson. ASM Washington DC.

4. Quality control in the Pharmaceutical Industry - Edt. by Murray S. Cooper Vol.2. Academic Press, New York.

5. Biotechnology – Edt. by H.J. Rehman and G. Reed, Vol 4. VCH Publications, Federal Republic of Germany.

6. Pharmaceutical Biotechnology by S.P. Vyas and V.K. Dixit. CBS Publishers and Distributors, New Delhi.

7. Good Manufacturing Practices for Pharmaceuticals Second Edition, by Sydney H. Willig, Murray M. Tuckerman, William S. Hitchings IV. Mercel Dekker NC New York.

8. Advances in Applied Biotechnology Series Vol 10, Biopharmaceuticals in transition. Industrial Biotechnology Association by Paine Webber. Gulf Publishing Company Houston.

9. Drug Carriers in biology and Medicine Edt. by Gregory Gregoriadis. Academic Press, New York.

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**2021-22**

**ELECTIVE PAPER**

**M.Sc. – MICROBIOLOGY, SEMESTER IV**

**Paper – IV – AGRICULTURE MICROBIOLOGY M.M. – 80**

**Unit 1:** PMBET – 405

Introduction – Soil as an environment for microorganisms. Classification of soil, physical and chemical properties of soil, structure of soil.

Microbial interactions - mutualism, commensalism, amensalism, synergism, parasitism, predation and competition.

Microbial interactions between plants– phyllosphere, mycorrhizae, rhizosphere and symbiotic association in root nodules. Biofertilizer – VAM, Rhizobium, Azospirillum, Azotobacter, cyanobacteria and Azolla.

**UNIT 2:**

Some bacterial diseases of agricultural crops- pathogens, symptoms and control measures with reference to paddy, cotton, maize, tomato, citrus, mango and potato.

Plant protection – phenolics – phytoalexins and related compounds. Bioinsecticides – viral, bacterial and fungal- a brief note.

**UNIT 3:**

Soil microbes and fertility of soil. Roles of microbes in biogeochemical cycles – carbon, nitrogen, phosphorus, Sulphur. Soil microbes and fertility of soil.

Aerobiology – a brief introduction - droplet nuclei – aerosols - air borne transmission of microbes and diseases -assessment of air quality.

**UNIT 4:**

Aquatic microbiology - factors affecting microbial growth – temperature – pressure – light – salinity - turbidity – pH -inorganic and organic constituents.

Aquatic habitats - freshwater - lakes, ponds and streams; marine habitats - estuaries, sea, hydrothermal vents, saltpans, coral reefs, mangroves and their associated microbial communities; Role of microbes in zonation – food chain and food web.

# (2021-2022)

## Project (Optional)

PMBGL-408

| Project Work | External | Internal | Total |
|---|---|---|---|
| Dissertation | 150 | 50 | 200 |
| Seminar based on project | 80 | 20 | 100 |
| **Total** | **230** | **70** | **300** |

1. A Student of IV Semester will have the option to opt for project work in lieu of two theory, Paper III & IV and lab courses II of M.Sc IV semester provided he/she secures at-least 65% or more marks in aggregate in semester I and II Semester.
2. The project has to be carried out in recognized national laborites or UGC recognized universities or any other reputed organization of public and private concern.
3. The valuation of all the projects will be carried out by the external examiner.

The project work should be related to the field of microbiology. The project report should include declaration by the candidate, certificate by the supervisor, acknowledgement, title and introduction along with the following points.

1. Introduction.
2. Review of Literature.
3. Materials and Methods.
4. Results and Discussion.
5. Summary/Conclusion.
6. Bibliography.

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