

**GOVERNMENT VISHWANATH YADAV TAMASKAR  
POST GRADUATE AUTONOMOUS COLLEGE  
DURG (C.G.)**

(Former Name – Govt. Arts & Science College, Durg)

Phone-0788-2211688, Fax- 0788-2212030

NAAC Accredited Grade 'A+'; CPE Phase - III (UGC, N. Delhi)

Website – [www.govtsciencecollegedurg.co.in](http://www.govtsciencecollegedurg.co.in)

**DEPARTMENT OF BIOTECHNOLOGY**



**SYLLABUS**

**VALUE ADDED COURSES**

**2022-23**

**VALUE ADDED COURSE**

**PERIOD – 30 HOURS**

**PROGRAMME SPECIFIC CODE- VBT**

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**DEPARTMENT OF BIOTECHNOLOGY**



**SYLLABUS**

**SCIENTIFIC VALIDATION OF  
TRADITIONAL KNOWLEDGE**

**2022-23**

**VALUE ADDED COURSE**

**PERIOD – 30 HOURS**

## **PROGRAMME SPECIFIC CODE- VBT**

### **PROGRAMME OUTCOME**

**The programme objectives are –**

1. To generate awareness about traditional knowledge among the students
2. To scientifically validate local traditional knowledge through modern scientific tools.
3. To develop expertise in the field of traditional knowledge, Risk Factor Assessment and toxicological Study.
4. To develop skill to undertake independent research approach and to accomplish it.

## GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG

Approved syllabus for Value Added Course by the members of Board of Studies for the Session - 2022-23

### Marking Scheme for 30 Hours Value Added Course

Course Code & Title of the Paper	Marks Allotted in Theory		Marks Allotted in Internal Assessment		Marks Allotted in Practical
	Max	Min	Max.	Min.	
VBT 101 - Scientific Validation of Traditional Knowledge	80	16	20	04	100

Course Duration - 30 Hours

1 Theory paper - 80

1 Internal Assessment - 20

1 Practical - 100

Total Marks - 200

The syllabus for M.Sc. Biotechnology is hereby approved for the session 2022-23-24.

Name and Signatures	
University Nominee – Prof. K. K. Sahu .....	Expert from other subject – Prof. Ranjana Shrivastava.....
Subject Expert – Dr. Pramod Mahish.....	Teacher Representation – Dr. Shweta Pandey.....
Subject Expert – Prof. M. M. Rai.....	Industrial Representation – Mr. Premanjan Biswas.....
Chairperson – Prof. Anil Kumar .....	Student Representation – Dr. Nikhil Mishra.....

# Govt. V.Y.T.PG. Autonomous College, Durg (CG)

## Autonomous Examination Cell

### Question Paper format and Distribution of Marks for 30 Hours Value Added

#### Course Examination

Question Paper Format and Distribution of Marks for 30 Hours Value Added Course Examination has been adopted as below mention scheme for the session 2022-23:

1. The question paper will be of 80 marks
2. Questions will be asked Unit-wise in each question paper.
3. From each Unit, the questions will be asked as follows :
  - Q.1 Very short answer type question  
(Answer in one or two sentences) (02 Marks)
  - Q.2 Very short answer type question  
(Answer in one or two sentences) (02 Marks)
  - Q.3 Short answer type question (Answer in 200-250 words) (04 Marks)
  - Q.4 Long answer type questions (Answer in 400-450 words) (12 Marks)

Type of Question	Unit-I	Unit-II	Unit-III	Unit-IV
For Q1 & 2: Very Short (Maximum two sentences)	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks
For Q3. Short 200-250 words	1 x 4 = 4 Marks	1 x 4 = 4 Marks	1 x 4 = 4 Marks	1 x 4 = 4 Marks
For Q4. Long answer 400-450 words	1 x 12 = 12 Marks	1 x 12 = 12 Marks	1 x 12 = 12 Marks	1 x 12 = 12 Marks

**Note:**

1. Question no. 1 and Question 2 will be compulsory.
2. Question no. 3 and 4 will consist of 2 optional questions of which one has to be attempted.
3. As mentioned above, two compulsory very short answer type questions (2+2 marks), one short answer type question with internal choice (4 marks) and one long answer type question with internal choice (12 marks) will be asked from each unit.  
Thus there will be questions of 20 marks from each unit and of total 80 marks from all the four units of the syllabus/syllabi.
4. Internal Assessment Examination will be as follows :
  - i. Internal Test in each paper (20 marks)
  - ii. Seminar (Power point presentation ) in any one of the paper (20 marks)
  - iii. Assignment in each of the remaining papers (excluding the paper of Seminar. (20 marks)
  - iv. Average of marks obtained in internal test + seminar in any one paper and marks obtained in internal test + assignment in rest of the papers will be calculated and taken into consideration.

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# GOVT. V.Y.T.PG. Autonomous College

## (Syllabus for Value Added Course)

Session -2022-23

Period – 30 Hours

Class – Value Added Course

Paper No.1 (VBT 101)

Title of Paper - Scientific Validation of Traditional Knowledge Max. Marks – 100

### Specific Outcome-

The outcome of paper will be empowerment of knowledge of students with the Local Traditional Knowledge.

### Learning Outcome-

As a learning outcome the student will be competent to understand the scientific reason behind traditional medicinal practices, problems related to health risks, dynamics of traditional medicines and the reason behind their activity.

## VALUE ADDED COURSE

### SCIENTIFIC VALIDATION OF TRADITIONAL KNOWLEDGE

#### Unit I

**Ethnomedicine** – Definition, history and its scope – Inter disciplinary approaches in ethnobotany – Collection of ethnic information. Importance of medicinal plants – role in human health care – health and balanced diet (Role of proteins, carbohydrates, lipids and vitamins).

#### Unit-II

**Tribal medicine** – Methods of disease diagnosis and treatment; **Traditional knowledge and utility of some medicinal plants in Chhattisgarh** – *Solanum trilobatum*, *Cardiospermum halicacabum*, *Vitex negundo*, *Adathoda vasica*, *Azadirachta indica*, *Gloriosa superba*, *Eclipta alba*, *Aristolochia indica*, *Phyllanthus fraternus* and *Boerhaavia diffusa* etc..

#### Unit III

**Scientific Validation of Traditional Knowledge:** Primary; Screening of Secondary Metabolites; Quantitative Estimation of Secondary Metabolites; TLC, HPLC; HPTLC; TEM;SEM; UV, Fluorimetry, Mass Spectroscopy(GC-MS,); Raman Spectra; Lipinski's Rule of five. Determination of heavy metals (Cadmium, Arsenic, lead etc.); Pesticide residue (DDT, BHC, toxaphene, aldrin).

#### Unit IV

Microbiological parameters; Radioactive contamination; Physical parameters (color, appearance, odor, clarity, viscosity, moisture content, pH, disintegration time, friability, hardness, flow ability, flocculation, sedimentation, settling rate and ash values); Chemical

parameters (limit tests, extractive values, chemical assays); Antioxidant Assay (DPPH, ABTS assay).

### Suggested Readings –

1. Ethnobiology – R.K.Sinha & Shweta Sinha – 2001. Surabhe Publications – Jaipur.
2. Tribal medicine – D.C. Pal & S.K. Jain 1998, Naya Prakash, 206, Bidhan Sarani, Calcutta – 700 006.
3. Contribution to Indian ethnobotany – S.K. Jain 1995, 3rd edition, Scientific publishers, P.B.No. 91, Jodhpur, India.
4. A Manual of Ethnobotany – S.K.Jain, 1995, 2nd edition. Practical:

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## LAB COURSE

**Practical: Max Marks: 100**

1. DPPH Antioxidant Activity Assay.
2. Qualitative Estimation of Secondary Metabolites.
3. Quantitative Estimation of Secondary Metabolites (Colorimetric, UV-Vis, HPLC).
4. Estimation of pesticide residue.
5. Thin layer Chromatography.
6. Estimation of Heavy Metals through Atomic Absorption Spectrophotometer.
7. ABTS (2,2' Azinothazoline-6 Sulfonic Acid) Assay.

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**LAB COURSE**  
**Scheme of Marks Distribution**

**Duration: 1 Days (8 hrs)**

**M.M.-100**

- |                                  |         |
|----------------------------------|---------|
| 1. 2 experiments from Unit – III | 20 each |
| 2. 2 experiments from Unit – IV  | 20 each |
| 3. Internal Assessment           | 10      |
| 4. Viva-voce                     | 10      |

**Total**

**100**

**The syllabus for M.Sc. Biotechnology is hereby approved for the session 2022-23-24.**

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**DEPARTMENT OF BIOTECHNOLOGY**



**SYLLABUS**

**GENOMIC ANALYSIS OF GENETIC  
DISEASES**

**2022-23**

**VALUE ADDED COURSE**

**PERIOD – 30 HOURS**

## **PROGRAMME SPECIFIC CODE- VBT**

### **PROGRAMME OUTCOME**

**The programme objectives are –**

1. Enhancement of understanding about genomic diseases.
2. Development of ability to understand Mendalian and Non-Mendalian genomic diseases.
3. Development of ability to examine, identify and create awareness about genetic diseases.
4. Enhancement of ability for scientific evaluation and to take control measure about genetic diseases.

## GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG

Approved syllabus for Value Added Course by the members of Board of Studies for the Session - 2022-23

### Marking Scheme for 30 Hours Value Added Course

Course Code & Title of the Paper	Marks Allotted in Theory		Marks Allotted in Internal Assessment		Marks Allotted in Practical
	Max	Min	Max.	Min.	
VBT 102 - Genomic Analysis of Genetic Diseases	80	16	20	04	100

Course Duration - 30 Hours

1 Theory paper - 80

1 Internal Assessment - 20

1 Practical - 100

Total Marks - 200

The syllabus for M.Sc. Biotechnology is hereby approved for the session 2022-23-24.

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## Autonomous Examination Cell

### Question Paper format and Distribution of Marks for 30 Hours Value Added

#### Course Examination

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1. The question paper will be of 80 marks
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3. From each Unit, the questions will be asked as follows :
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  - Q.3 Short answer type question (Answer in 200-250 words) (04 Marks)
  - Q.4 Long answer type questions (Answer in 400-450 words) (12 Marks)

Type of Question	Unit-I	Unit-II	Unit-III	Unit-IV
For Q1 & 2: Very Short (Maximum two sentences)	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks
For Q3. Short 200-250 words	1 x 4 = 4 Marks	1 x 4 = 4 Marks	1 x 4 = 4 Marks	1 x 4 = 4 Marks
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**Note:**

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  - ii. Seminar (Power point presentation) in any one of the paper (20 marks)
  - iii. Assignment in each of the remaining papers (excluding the paper of Seminar. (20 marks)
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# GOVT. V.Y.T.PG. Autonomous College

(Syllabus for Value Added Course)

**Session -2022-23**

**Period – 30 Hours**

**Class – Value Added Course**

**Paper No.1 (VBT 102)**

**Title of Paper - Genomic Analysis of Genetic Diseases Max. Marks – 100**

## **Specific Outcome-**

The outcome of paper will be empowerment of knowledge of students with the Genomic disorders prevalent in the society.

## **Learning Outcome-**

As a learning outcome the student will be competent to understand the scientific reason behind occurrences of the genetic disorders, related to health risks, dynamics of gene sequence alterations and the reason behind their area wise expression and biotechnological tools available for the study.

## **VALUE ADDED COURSE**

### **GENOMIC ANALYSIS OF GENETIC DISEASES (VBT102)**

#### **Unit 1:**

##### **Genes in Families -**

- 1.1 Patterns of Inheritance (AD, AR, XD, XR, YL, Maternal inheritance)
- 1.2 Pedigree analysis.
- 1.3 Extensions to Mendelian inheritance, Incomplete penetrance and variable expressivity, Epistasis, pleiotropism, Gamete imprinting, Mosaicism, Anticipation, Genetic and phenotypic heterogeneity (Inter and Intra allelic heterogeneity).
- 1.4 Segregation analysis, Analysis of multifactorial condition-polygenic inheritance, Threshold model, Twin studies in genetic analysis.

#### **Unit 2:**

##### **Linkage Analysis –**

- 2.1 Linkage detection and estimation, Parametric and non-parametric methods: Lod score,  $\chi^2$ -statistics, sib-pair method, IBD, affected relatives methods
- 2.2 Linkage analysis through family studies-Homozygosity mapping
- 2.3 Extensions of linkage studies for genetic heterogeneity, reduced penetrance and epistasis

2.4 Population based Linkage analysis, Whole genome linkage analysis, Genetic models and Allelic effects, Different types of genetic markers, Linkage disequilibrium analysis, Haplotype analysis, Analysis of gene-phenotype interactions.

### **Unit 3:**

#### **Hemoglobinopathies and Genetic Study Tools –**

3.1 Sickle Cell Anemia, Thalassemia, G6-PD Deficiency, Haemophilia, Parvovirus-B19; Genome-wide association (GWAS): Genotyping;

3.2 Tests of association; Imputation and meta-analysis; Interpretation of results.

3.3 Genome-wide genotyping (Affymetrix, Illumina; Random SNPs; haplotype tag variants; Copy number probes; lower frequency variants; Exome variants); Next Generation Sequencing (NGS).

3.4 Mapping: Low resolution mapping: Sub-chromosomal mapping, Chromosomal break points, FISH, cytogenetic methods, Somatic cell hybrid mapping, Radiation hybrid mapping, High resolution mapping: DNA FIBRE FISH, Restriction mapping, VNTR microsatellite markers for mapping, EST mapping, STS mapping, SNP mapping.

### **Unit 4:**

#### **Genetic Basis of Human Diseases**

4.1 Molecular pathology of Chromosome anomalies, Numerical chromosomal disorders, Structural chromosomal disorders, Chromosome instability syndromes.

4.2 Molecular basis of single gene disorders, Autosomal Dominant and recessive disorders X-linked dominant and recessive disorders, Y-linked, X-influenced and X-limited disorders.

4.3 Inherited biochemical diseases, Enzyme defects- amino acid metabolism, Lipid metabolic disorders, Carbohydrate associated disorders, Defects in purine metabolism.

4.4 Complex genetic diseases – Hypertension, Diabetes mellitus, Mitochondrial diseases, Cancer as a genetic disease, Familial and sporadic cancers – Oncogenes, tumor suppressor genes, mutator genes.

#### **Suggested Readings –**

1. Cummings, M.R. (2009). Human Heredity: Principles and Issues. Pacific Grove, CA:Brooks/Cole.
2. A.G. Motulsky and F. Vogel (1986) Human Genetics
3. R. F. Mueller and I.D Yound (2001) Emery's Elements of Medical Genetics
4. Curt Stern (1960) Principles of Human Genetics
5. Robert et al., (2015)Thompson and Thompson Genetics in Medicine, Elsevier, Saunders, London
6. Gardner, A. and Davies, T. (2009) Human Genetics-Scion Publishing, 2nd ed.

7. Lewis, R. (2008) Human Genetics: Concepts and Applications, McGraw-Hill Publishing, New York, 8th ed.
8. Lewis, R. (2011). Human Genetics —The Basics , Routledge, London
9. Mange, E.J. and Mange, A.P. (1999). Basic Human Genetics. Sinauer, Sunderland
10. Scriver, C.R. A.L. Beudit, W.S. Sty abnd D. Valle, Molecular Basis of Inherited Diseases, (6th Edition 1989) by EdsO McGrawHill, New York.
11. Tom Strachan and Andrew Read (1996) Human Molecular Genetics
12. H. Harris (1975) Principles of Human Biochemical Genetics

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Chairperson – Prof. Anil Kumar .....	Student Representation – Dr. Nikhil Mishra.....



## LAB COURSE

**Practical: Max Marks: 100**

1. Pedigree analysis
2. Sister chromatid exchanges
3. Amino acidopathies and carbohydrate metabolic error identification
4. Segregation analysis
5. Problems on Parametric and non-parametric variables
6. Lod score
7. Sib pairs
8. Haplotype analysis
9. LD Maps
10. Hb Electrophoresis

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## LAB COURSE Scheme of Marks Distribution

**Duration: 1 Days (8 hrs)**

**M.M.-100**

- |                                  |         |
|----------------------------------|---------|
| 1. 2 experiments from Unit – II  | 20 each |
| 2. 2 experiments from Unit – III | 20 each |
| 3. Internal Assessment           | 10      |
| 4. Viva-voce                     | 10      |

**Total**

**100**

**The syllabus for M.Sc. Biotechnology is hereby approved for the session 2022-23-24.**

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**DEPARTMENT OF BIOTECHNOLOGY**



**SYLLABUS**

**BIOFERTILIZER AND BIOPESTICIDE PRODUCTION**

**2022-23**

**VALUE ADDED COURSE**

**PERIOD – 30 HOURS**

**PROGRAMME SPECIFIC CODE- VBT**

## **PROGRAMME OUTCOME**

**The programme objectives are –**

1. Knowledge attainment about environmental friendly biofertilizer and biopesticide development..
2. Enhancement of identification of natural sources for biofertilizer production.
3. Enhancement of identification of natural sources for biopesticide production.
4. Application of biotechnological tools for biofertilizer and biopesticide development.

**GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG**

**Approved syllabus for Value Added Course by the members of Board of Studies for the Session - 2022-23**

**Marking Scheme for 30 Hours Value Added Course**

Course Code & Title of the Paper	Marks Allotted in Theory		Marks Allotted in Internal Assessment		Marks Allotted in Practical
	Max	Min	Max.	Min.	
<b>VBT 103 - Biofertilizer and Biopesticide Production</b>	80	16	20	04	100

**Course Duration** - 30 Hours

**1 Theory paper** - 80

**1 Internal Assessment** - 20

**1 Practical** - 100

**Total Marks** - 200

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**Autonomous Examination Cell**

**Question Paper format and Distribution of Marks for 30 Hours Value Added**

**Course Examination**

Question Paper Format and Distribution of Marks for 30 Hours Value Added Course Examination has been adopted as below mention scheme for the session 2022-23:

1. The question paper will be of 80 marks
2. Questions will be asked Unit-wise in each question paper.
3. From each Unit, the questions will be asked as follows :
  - Q.1 Very short answer type question  
(Answer in one or two sentences) (02 Marks)
  - Q.2 Very short answer type question  
(Answer in one or two sentences) (02 Marks)
  - Q.3 Short answer type question (Answer in 200-250 words) (04 Marks)
  - Q.4 Long answer type questions (Answer in 400-450 words) (12 Marks)

Type of Question	Unit-I	Unit-II	Unit-III	Unit-IV
For Q1 & 2: Very Short (Maximum two sentences)	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks
For Q3. Short 200-250 words	1 x 4 = 4 Marks	1 x 4 = 4 Marks	1 x 4 = 4 Marks	1 x 4 = 4 Marks
For Q4. Long answer 400-450 words	1 x 12 = 12 Marks	1 x 12 = 12 Marks	1 x 12 = 12 Marks	1 x 12 = 12 Marks

Note:

1. Question no. 1 and Question 2 will be compulsory.
2. Question no. 3 and 4 will consist of 2 optional questions of which one has to be attempted.
3. As mentioned above, two compulsory very short answer type questions (2+2 marks), one short answer type question with internal choice (4 marks) and one long answer type question with internal choice (12 marks) will be asked from each unit.  
Thus there will be questions of 20 marks from each unit and of total 80 marks from all the four units of the syllabus/syllabi.
4. Internal Assessment Examination will be as follows :
  - i. Internal Test in each paper (20 marks)
  - ii. Seminar (Power point presentation ) in any one of the paper (20 marks)
  - iii. Assignment in each of the remaining papers (excluding the paper of Seminar. (20 marks)
  - iv. Average of marks obtained in internal test + seminar in any one paper and marks obtained in internal test + assignment in rest of the papers will be calculated and taken into consideration.

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## GOVT. V.Y.T.PG. Autonomous College

(Syllabus for Value Added Course)

Session -2022-23

Period – 30 Hours

Class – Value Added Course

Paper No.1 (VBT 102)

## **Title of Paper - Genomic Analysis of Genetic Diseases Max. Marks – 100**

### **Specific Outcome-**

The outcome of paper will be promotion of organic farming in the region through technical capacity building of all stakeholders and facilitation of the students to understand basics of biofertilizer

### **Learning Outcome-**

As a learning outcome the student will be competent get training to develop skills about handling, cultivation, and propagation of quality microbial inoculants, get exposure to biofertilizer production technology so that they are ready for industry as entrepreneurs and it will improve the professional competencies and upgrade the knowledge and develop technical skills of biofertilizer production

## **VALUE ADDED COURSE**

## **BIOFERTILIZER AND BIOPESTICIDE PRODUCTION (VBT103)**

### **Unit 1:**

- 1.1 Introduction and types and importance of biofertilizers,
- 1.2 Biopesticides and bioagents in agriculture and organic farming system;
- 1.3 Classification of microorganisms for biofertilizers production;
- 1.4 Nitrogen cycle and Nitrogen fixation (Role of Nif and Nod gene)

### **Unit 2:**

- 2.1 Quality control of biofertilizers,
- 2.2 Mass multiplication and packing; Registration of biofertilizers.
- 2.3 Marking and Registration with CIB of bioagents and biopesticides;
- 2.4 Importance of *Trichoderma* spp., *Pseudomonas* spp. and *Bacillus* spp. as biocontrol agents. Importance of *Trichogramma*, *Cryptolaemus*, *Chrysoperla*, NPV and entomofungal pathogens.

### **Unit 3:**

- 3.1 Establishing insectary for host insects and natural enemies,
- 3.2 Mass production of *Verticillium*/ *Beauveria*/ *Metarhizium*/ *Nomuraea*/ *Paecilomyces*/ *Hirsutella thompsoni*/ *Trichoderma*.
- 3.3 Mass Production of *Pseudomonas*/ *Bacillus*/ Potash Mobilizers/ Sulphur oxidizers /organic matter decomposers.

3.4 Structure and characteristic features of bacterial Bio fertilizers- Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium and Frankia; Cynobacterial biofertilizers- Anabaena, Nostoc, Hapalosiphon and fungal biofertilizers- AM mycorrhiza and ectomycorrhiza.

**Unit4:**

- 4.1 Production technology: Strain selection, sterilization, growth and fermentation,
- 4.2 Equipment, mass production of carrier based and liquid bio fertiizers. FCO specifications and quality control of bio fertilizers.
- 4.3 Mechanism of phosphate solubilization and phosphate mobilization, K solubilization.
- 4.4 Production technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid biofertiizers. FCO specifications and quality control of biofertilizers. Application technology for seeds, seedlings, tubers, sets etc. Biofertilizers - Storage, shelf life, quality control and marketing. Factors influencing the efficacy of biofertilizers. Application technology for seeds, seedlings, tubers, sets etc.

**Suggested Readings –**

1. Motṣora, M.R., P. Bhattacharya and Beena Srivastava ( 1995). Biofertilizer Technology, Marketing and Usage-A Source Bookcum-Glossary(FDCO, New Delhi).
2. Subbarao, N.S. 1993. Biofertilizers in Agriculture and Forestry ( Oxford and IBH Pub. Co., New Delhi).
3. General Microbiology – Dubey and Maheshwari

The syllabus for M.Sc. Biotechnology is hereby approved for the session 2022-23-24.

Name and Signatures	
University Nominee – Prof. K. K. Sahu .....	Expert from other subject – Prof. Ranjana Shrivastava.....
Subject Expert – Dr. Pramod Mahish.....	Teacher Representation – Dr. Shweta Pandey.....
Subject Expert – Prof. M. M. Rai.....	Industrial Representation – Mr. Premanjan Biswas.....
Chairperson – Prof. Anil Kumar .....	Student Representation – Dr. Nikhil Mishra.....

**LAB COURSE**

**Practical: Max Marks: 100**



1. Isolation and purification of important biopesticides: Trichoderma Pseudomonas, Bacillus, Metarhyzium etc and its production.
2. Identification of important botanicals.
3. Visit to biopesticide laboratory in nearby area.
4. Field visit to explore naturally infected cadavers.
5. Identification of entomopathogenic entities in field condition.
6. Quality control of biopesticides.
7. Isolation and purification of Azospirillum , Azotobacter, Rhizobium, P-solubilizers and cyanobacteria. 8. Mass multiplication and inoculums production of biofertilizers.
9. Isolation of AM fungi -Wet sieving method and sucrose gradient method.
10. Mass production of AM inoculants.

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### LAB COURSE Scheme of Marks Distribution

**Duration: 1 Days (8 hrs)**

**M.M.-100**

- |                                  |         |
|----------------------------------|---------|
| 1. 2 experiments from Unit – II  | 20 each |
| 2. 2 experiments from Unit – III | 20 each |
| 3. Internal Assessment           | 10      |
| 4. Viva-voce                     | 10      |

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**Total** **100**

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