

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED**

**B.Sc. GENERAL (SEMESTER PATTERN)**

**B.Sc. THIRD YEAR**

**BIOTECHNOLOGY (VOCATIONAL) –MCQ PATTERN**

**With Effect from June - 2013**

**B. Sc. BIOTECHNOLOGY (VOCATIONAL) CURRICULUM****(SEMESTER PATTERN)**

<b>Class</b>	<b>Paper No. Code no.</b>	<b>Title of Paper</b>	<b>Periods/ Practical's</b>	<b>Time duration of Examination</b>	<b>Maximum Marks</b>
B.Sc.IIlyr Semester-V	Paper -I VBT- 1.12	Plant tissue culture	45	3 Hrs.	40+10*
	Paper -II VBT-1.13	Environmental Biotechnology	45	3 Hrs.	40+10*
B.Sc.IIlyr Semester-VI	Paper -III VBT-1.14	Plant transgenesis	45	3 Hrs.	40+10*
	Paper -IV VBT-1.15	Bioresource Technology	45	3 Hrs.	40+10*
B.Sc.IIlyr	VBP-1.16 (Practical) Annual pattern	Practical Based On Theory Papers Of VBT-1.12 & VBT-1.14	15	4 Hrs. for two consecutive days	50
B.Sc.IIlyr	VBP-1.17 (Practical) Annual pattern	Practical Based On Theory Papers Of VBT-1.13 & VBT-1.15	15	4 Hrs. for two consecutive days	50

\* Internal marks

**Workload:**

- Theory:** Per paper per week three periods
- Practical:** Per batch per week two practical (Three periods)

**B. Sc. THIRD YEAR BIOTECHNOLOGY (VOCATIONAL)**  
**SEMESTER – V**  
**THEORY PAPER I**  
**VBT- 1.12 (PLANT TISSUE CULTURE)**

Periods – 45

Maximum Marks – 50

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**Unit-I (12 Periods)**

Introduction to plant tissue culture: Laboratory organization Sterilization Techniques, Media: Chemical media & its composition, Callus culture.

Beginning of in vitro cultures in our country (ovary ovule culture, in vitro pollination and fertilization).

Embryo culture, its applications.

Introduction to the processes of embryogenesis and organogenesis and their practical applications.

Meristem culture. & its applications

**Unit-II (12 periods)**

Haploids and their applications (treasure your exceptions).

Endosperm culture and production of triploids.

Practical application of tissue and organ culture.

Single- cell suspension cultures and their applications

**Unit-III (10Periods)**

Introduction to protoplast isolation: principles and applications.

Various steps in the regeneration of protoplasts.

Somatic hybridization – an introduction & its applications

**Unit-IV (11 Periods)**

Various methods for fusing protoplasts. Chemical , electrical.

Use of markers for selection of hybrid cells.

Practical applications of somatic hybridization (hybrids Vs Cybrids).

**Text & References:**

1. Plant biotechnology - B.D.Singh
2. An introduction to Plant biotechnology –H.C. Chawla.
3. An introduction to Plant tissue culture – A.K.Razdhan
4. Biotechnology - B.D.Singh
5. Introduction to plant tissue culture – M.K. Razdan
6. Plant tissue culture : Theory and practice- S.S. Bhojawani and M.K.Razdan

**B. Sc. THIRD YEAR BIOTECHNOLOGY (VOCATIONAL)  
SEMESTER – V  
THEORY PAPER II  
VBT- 1.13 (ENVIRONMENTAL BIOTECHNOLOGY)**

Periods – 45

Maximum Marks – 50

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**Unit-I (10Periods)**

Environment Basic concepts & issues interaction between Environment and biota.  
Introduction to environmental biotechnology  
History of environmental biotechnology  
Renewable and non-renewable resources

**Unit-II (10Periods)**

Environmental pollution, Methods for the measurement of pollution Air pollution and its control through Biotechnology, Water Pollution and its control; Measurement and sources water pollution.

**Unit-III (13Periods)**

Modern fuels and their environmental impacts: Methanogenic bacteria and biogas production,  
Microbial hydrogen production  
Conversion of sugars to ethanol. The gasohol experiment.  
Solar energy converters – hopes from the photosynthetic pigments.

**Unit-IV (12Periods)**

Transgenic sheep and transgenic plants advantages & its disadvantages  
Treatment schemes for waste waters of dairy, distillery, tannery, sugar, antibiotic industries.  
Global Environmental problems: The greenhouse effect, Ozone depletion, Ultraviolet Radiation, Acid Rain, Biotechnological approaches for management.

**Text & References:**

1. Environmental Biotechnology – Indu shekharThakur
2. Environmental Chemistry – B.K.Sharma
3. Biotechnology – B.D.Singh
4. Waste water engineering – Metcalf and Eddy
5. Environmental biotechnology by S.N. Jogdand.

**B. Sc. THIRD YEAR BIOTECHNOLOGY (VOCATIONAL)  
SEMESTER – VI  
THEORY PAPER III  
VBT- 1.14 (PLANT TRANSGENESIS)**

Periods – 45

Maximum Marks – 50

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**Unit-I (10Periods)**

Introduction to transgenic plants. Advantages and Disadvantages.

Introduction to *A.tumefaciens*.

Tumor formation on plants using *A.tumefaciens* (monocots Vs Dicots).

Root - formation using *A.rhizogenes*

**Unit-II (10 Periods)**

Mechanism of DNA transfer, role of virulence genes, use of Ti & Ri as vectors

Binary vectors, use of reporter genes, methods of nuclear transformation, viral vectors and their applications.

Multiple gene transfers vector less or direct gene transfer, particle bombardment,

Electroporation, microinjection, transformation of monocots.

**Unit-III (13 Periods)**

Biopesticides v/s chemical pesticides: advantages and disadvantages

Examples of biopesticides: Bt-based biopesticides,

Integrated Pest Management (IPM): Use of insect resistant crops,

Ecological approach of IPM.

**Unit-IV (12 Periods)**

Applications of plant transformation, herbicide resistance, insect resistance, virus resistance, Drought resistance, pests resistance, long shelf life of fruits and flowers.

Plant secondary metabolites, industrial enzymes, biodegradable plastic, edible vaccines.

**Text & References:**

1. Biotechnology - B.D.Singh
2. Plant Biotechnology – B.D.Singh
3. Biotechnology – P.K.Gupta
4. Introduction to plant tissue culture – M.K. Razdan
5. Plant tissue culture: Theory and practice- S.S. Bhojawani and M.K.Razdan

**B. Sc. THIRD YEAR BIOTECHNOLOGY (VOCATIONAL)  
SEMESTER – VI  
THEORY PAPER IV  
VBT- 1.15 (BIORESOURCE TECHNOLOGY)**

Periods – 45

Maximum Marks – 50

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**Unit-I (10 Periods)**

Biodegradation: Definition and Concept,  
Biodegradation. Aerobic and Anaerobic degradation pathways in Microbes.  
Biodegradation of Hydrocarbon with Suitable Example.

**Unit-II (12 Periods)**

Degradation of pesticides and Xenobiotic compounds by microorganisms.  
Biopesticides , *Thuringiensis* toxin as a natural pesticides.  
Biological control of other insects swarming the agricultural fields.  
Biofertilizers, Nitrogen fixing microorganisms enrich the soil with assimilable nitrogen.  
Bioinoculants : Inoculum preparation, *Rhizobium*, *Trichidroma*.

**Unit-III (13 Periods)**

Bioremediation: Definition and Concept, Bioremediation of soil (Saline & Alkaline soil)  
Applications of Bioremediation  
Phytoremediation: Concept and Types.

**Unit-IV (10Periods)**

Biofuel & Biodiesel  
Bioleaching  
Biopolymers and Bioplastics

**Text & References:**

1. Environmental Biotechnology – Indu shekharThakur
2. Environmental Chemistry – B.K.Sharma
3. Biotechnology – B.D.Singh
4. Environmental Chemistry – A.K.De
5. Introduction to Biodeterioration – D.Allsopp and seal
6. Introduction to Environmental Biotechnology- Chatterji A.K
7. Environmental Science and Biotechnology -Murugesan A. G.and Rajakumari

**B.Sc. THIRD YEAR, BIOTECHNOLOGY ( VOCATIONAL)  
PRACTICAL PAPER – III (Annual)  
BASED ON THEORY PAPERS OF BTT-1.12 & BTT-1.14**

Practical –17

Maximum Marks – 50

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**Plant tissue culture & Plant transgenesis**

Practical 1 : Equipments and other requirements in plant tissue culture laboratory.

Practical 2 : preparation of MS & white's media.

Practical 3 : preparation of root & shoot induction media.

Practical 4 : preparation sugarcane tissue culture media.

Practical 5 : preparation of embryo culture media.

Practical 6 : sterilization of explants.

Practical 7 : Initiation of callus.

Practical 8: organogenesis of cultured leaf disc of banana.

Practical 9: Tissue culture of cereals.

Practical 10 : Embryo culture of papaya.

Practical 11 : Preparation of synthetic seeds.

Practical 12 : Isolation of Plasmid

Practical 13 : Plant Transformation

Practical 14 : Isolation of protoplast

Practical 15: Agarose gel electrophoresis.

Practical 16: *Agrobacterium* culture & selection of transformants

Practical 17: Meristem culture for medicinal plant

**B.Sc. THIRD YEAR, BIOTECHNOLOGY ( VOCATIONAL)  
PRACTICAL PAPER – III (Annual)  
BASED ON THEORY PAPERS OF BTT-1.13 & BTT-1.15**

Practical – 17

Maximum Marks – 50

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**Environment biotechnology & Bioresource technology**

Practical 1 : Estimation of calcium content of water sample.

Practical 2 : Estimation of  $\text{mg}^{++}$  ions in water.

Practical 3 : Enrichment & isolation of hydrocarbon degraders.

Practical 4 : Walkey & Blakey modified method for estimation of organic matter.

Practical 5 : Biological oxygen demand.

Practical 6 : Chemical oxygen demand

Practical 7 : Isolation of nitrogen fixing rhizobia

Practical 8 : Determination of chlorides in water

Practical 9 : Estimation of TS, T.D.S., from given water sample.

Practical 10: Estimation of dissolved oxygen.

Practical 11: Isolation of Azatobacter from soil

Practical 12 : Qualitative analysis of water(MPN).

Practical 13 : Total alkalinity of water sample.

Practical 14 : Estimation of amount of acidity.

Practical 15 : Hardness of water sample by EDTA method.

Practical 16: Field work (one day)

Practical 17: Determination of soil pH and Total organic carbon



**SKELETON OF QUESTION PAPER**

**B.Sc. THIRD YEAR BIOTECHNOLOGY (VOCATIONAL)**

**SEMESTER-V**

**THEORY PAPER – XII / XIII**

**VBT- 1.12 (PLANT TISSUE CULTURE) /**

**VBT- 1.13 (ENVIRONMENTAL BIOTECHNOLOGY)**

**Time:** *Three hours*

**Maximum Marks:** *50*

**Note:** - (i) Attempt all questions

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**VBT- 112 PLANT TISSUE CULTURE**

<b>Q.1.</b> Multiple Choice Questions	40 marks
Internal marks	10 marks

**VBT- 113 ENVIRONMENTAL BIOTECHNOLOGY**

<b>Q.1.</b> Multiple Choice Questions	40 marks
Internal marks	10 marks

**SKELETON OF QUESTION PAPER**

**B.Sc. THIRD YEAR BIOTECHNOLOGY (VOCATIONAL)**

**SEMESTER- VI**

**THEORY PAPER – XIV /XV**

**VBT- 1.14 (PLANT TRANSGENESIS) /**

**VBT- 1.15 (BIORESOURCE TECHNOLOGY)**

***Time:*** Three hours

***Maximum Marks:*** 50

**Note:** - (i) Attempt all questions

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**VBT- 114 PLANT TRANGENESIS**

**Q.1.** Multiple Choice Questions 40 marks  
Internal marks 10 marks

**VBT- 113 BIORESOURCE TECHNOLOGY**

**Q.1.** Multiple Choice Questions 40 marks  
Internal marks 10 marks

**PROFORMA FOR PRACTICAL EXAMINATION**  
**SWAMI RAMANAND TREETH MARATHWADA UNIVERSITY, NANDED**  
**Faculty of Science**  
**B. Sc. III year Vocational Biotechnology**  
**Practical Examination**  
**VBP- 1.16**

Time: 9.00 am to 1.00 pm (for two consecutive days)	Marks: 50
Q 1) Major Question (Plant tissue culture)	10
Q 2) Major Question (Plant tissue culture)	10
Q 3) Major Question (Plant transgenesis)	10
Q 4) Major Question (Plant transgenesis)	10
Q 5) Viva-Voce	05
Q 6) Record Book	05

**PROFORMA FOR PRACTICAL EXAMINATION**  
**SWAMI RAMANAND TREETH MARATHWADA UNIVERSITY, NANDED**  
**Faculty of Science**  
**B. Sc. III year Vocational Biotechnology**  
**Practical Examination**  
**VBP- 1.17**

Time: 2.00 pm to 6.00 pm (for two consecutive days)	Marks: 50
Q 1) Major Question (Environmental Biotechnology)	10
Q 2) Major Question (Environmental Biotechnology)	10
Q 3) Major Question (Bioresource technology)	10
Q 4) Major Question (Bioresource technology)	10
Q 5) Viva-Voce	05
Q 6) Record Book	05