

# 20BT003 NATURAL PRODUCT TECHNOLOGY

Hours Per Week :

L	T	P	C
3	-	3	5

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
45	-	45	-	-	-	-	-	-

## Course Description and Objectives:

**Objective:** All round development of student to make him identify the self employment opportunities in the Natural Product Technology field.

1. The course offers knowledge on various bio-products and their self employment creating opportunities.
2. The course transforms student in to skilled personnel in the natural product discovery and isolation technology.
3. The course is the combination of knowledge and skill development in the Natural Product Technology required to become an entrepreneur.
4. The objective of the course is to create awareness on a wide array of biologically derived products. In addition, it also encourages students to explore entrepreneurship in the arena of natural products.

## Course Outcomes:

The student will be able to:

1. Gain insights on a wide range Uses of natural compounds viz. ,antibiotics, biofuels, biomaterials, biochemicals of therapeutic and nutritional importance. .
2. Analyze and perceive green entrepreneurship and bioproduct market.
3. It throws light on the broad spectrum of bioactive molecules which can be exploited without harming environment.
4. Develops skills of isolating useful molecules by learning techniques like chromatographies and hairy root induction in practical sessions.
5. It gives information on the current scenario of natural products in medical field and agriculture field.
6. Gains experience in the technological work involved in the natural product field.

## SKILLS:

- ✓ Skill of isolating useful biomolecules is developed
- ✓ Skill of analyzing the molecules by spectroscopic methods is gained
- ✓ Skill of developing transformed cultures for active biomolecules
- ✓ Designing small scale industry setup.

**Unit – I:**

**Introduction to Natural Product Technology:** Natural products and their uses and Fundamentals, Pharmaceutically important molecules from plants and scope of the subject, Pharmaceutically important molecules isolated from Microbes and its scope, Biofuels and Biopesticides Research and development. Techniques involved in Natural Product Technology

**Unit – II:**

**Techniques in Isolation of Natural compounds:** Chemicals and Instruments used in the Natural product technology, Theory of extraction of compounds from plants and thin layer chromatography, Extraction of compounds from Microbial Cultures, Theory for preparative Thin Layer Chromatography and Column Chromatography, Theory of recrystallization techniques and Ion exchange method.

**Unit – III:**

**Tissue culture Techniques in Natural Product Technology:** Uses of learning Tissue culture in Natural Product Technology, Theory for different Media preparations MS basal and LB broth, Theory of Fermentation Technology of Microbial Broths, Surface sterilization of Tissues and Inoculations, Media modifications with precursors, and hormones to enhance the quantity of compounds, Elicitation and immobilization of cultured cells. Theory for Hairy root induction and their uses.

**Unit – IV:**

**Molecular Techniques involved in Natural Product Technology:** Theory of Analysis of compounds through HPLC and GC, Quantification of compounds and analysis and statistical methods, Industrial experts lecture on Current scenario and opportunities, Theory on How to establish small scale natural product start up with less expenditure as a self employment scheme (new syllabus with pictures and photos)

**Unit – V:**

**Patents:** Indian and international patent laws, proposed amendments as applicable to herbal/ natural products and process. Geographical indication, Copyright, Patentable subject matters, novelty, non obviousness, utility, enablement and best mode, procedure for Indian patent filing, patent processing, grant of patents, rights of patents, cases of patents, opposition and revocation of patents, patent search and literature, Controllers of patents.

**ACTIVITIES:**

- Isolation of bioactive compounds.
- Development of protocol industrial scale production
- Plant tissue culture techniques
- Spectrophotometer handling and analysis
- Analytical skills can be developed

**LABORATORY EXPERIMENTS****Laboratory Experiments**

Total hours: 30

1. Solvent Extraction of compounds from tissues and thin layer chromatography
2. Column chromatography
3. Preparative thin layer chromatography
4. Media preparations and culturing of useful bacteria and fungi
5. Compound isolation from microbial growth
6. Biopesticidal activity (Demo) and fermentation method (Demo)

7. Hairy root induction
8. Computing the HPLC, Mass and NMR analytical data to identify the required compound by using known compounds HPLC and NMR and mass data

**Text books:**

1. Biofertilizer and Biopesticide – 1 March 2011 by [Shalini Suri](#) (Author)
2. Fundamentals of biofuel processes, Edition 1. Authors Debabrata das, Jhansil. Varanasi.
3. Environmental chemistry, M.Sc Chemistry, Final year Paper VIII
4. Analytical Chemistry ANUCDE M.Sc Chemistry Paper V
5. Biotechnology-A text book of Industrial Microbiology. W. Crueger and A.Cruegar, 2000.

**Reference Books:**

1. Manual of Industrial Microbiology and Biotechnology. A.L.Demain and J.W.Davies (Eds), 1999.
2. Plant Tissue Culture and Biotechnology: Emerging Trends. by P.B. **Kavi Kishor**. January 1999.
3. Principles of Biochemistry (Lehninger) by Nelson and Cox for Molecular biology basics
4. Principles of fermentation technology. P.F.Stanbury, A.Whitaker and S.J.Hall, 1997
5. Hairy Roots. An Effective Tool of Plant Biotechnology 6th December 2018  
ISBN: 9789811325618. [Vikas Srivastava](#) , [Shakti Mehrotra](#), [Sonal Mishra](#).