SEMESTER-V

COURSE 15: APPLICATIONS OF BIOTECHNOLOGY

Theory Credits: 3 3 hrs/week

I. LEARNING OUTCOMES

On successful completion of the course, the students will be able to

1. Learn about concept of culturing of stem cells and tissues
2. Learn about Applications of recombinant DNA technology
3. Learn about Intellectual Property Rights and Patenting issues
4. Learn about energy resources
5. Learn about Microbial treatment and degradation

II. Syllabus

UNIT-I

1. Culture of cells and tissues (including Stem cells and their application)
2. In vitro fertilization and embryo transfer technology, Methods of gene transfer – Microinjection and viral mediated gene transfer techniques
3. Production of transgenic animals and molecular pharming, Principles of Ex vivo and In vivo gene therapy

UNIT-2

1. Mass cultivation of cell cultures and process engineering – batch and continuous cultures, Bioreactors
2. Production of commercially useful compounds by plant cell culture, Methods of gene transfer techniques (*Agrobacterium*, Microprojectile bombardment)
3. Applications of recombinant DNA technology in agriculture, Production of therapeutic proteins from transgenic plants

UNIT-III

1. Primary and secondary metabolic products of microorganisms
2. Commercial production of fuels and chemicals by microbial fermentations
3. Animal cells as bioreactors, Intellectual Property Rights and Patenting issues

UNIT-IV

1. Renewable and non-renewable energy resources
2. Conventional energy sources and their impact on environment.
3. Non-conventional fuels and their impact on environment

UNIT-V

1. Microbiological treatment of municipal and industrial effluents
2. Microbial degradation of pesticides and toxic chemicals
3. Biopesticides and Biofertilizers (Nitrogen fixing, phosphate solubilizing microorganisms), Microbial ore leaching

III . Skills Outcome

On Successful Completion of this Course, Student shall be able to

1. Learn about different isolations of microorganisms from various sources
2. Learn about production of alcohol and wine
3. Identify the purity of sample
4. Identify the DO/ BOD/COD in different sample
5. Learn about isolation on food spoiling Microorganisms

SEMESTER-V

COURSE 15: APPLICATIONS OF BIOTECHNOLOGY

Practical Credits: 1 2 hrs/week

1. Isolation of industrially important microorganisms from soil.
2. Production of alcohol or wine using different substrates.
3. Detection of coliforms for determination of the purity of potable water.
4. Determination of dissolved oxygen concentration of water sample
5. Determination of biological oxygen demand of sewage sample
6. Determination of chemical oxygen demand (COD) of sewage sample.
7. Quantitative analysis of food for a) Moisture b) ash c) Iron d) Calcium
8. Isolation and identification food spoiling microorganisms.

V. REFERENCES

1. Industrial Microbiology by A.H.Patel,2009
2. Prescott & Dum (2002) Industrial Micrbiology, Agrabios (India) ,2005,Publishers
3. Creueger W. & Crueger A.A Text of Industrial Microbiology,2000, 2nd Edition, Panima Publishers corp.
4. K. Vijaya Ramesh, Environmental Microbiology, 2004,MJP Publishers, Chennai.
5. A.G. Murugesan, C. Raja Kumari, Environmental Science & Biotechnology - Theory &
6. Techniques, 2005,MJP Publishers
7. "Food Biotechnology" by Elsayed Abdel-Aal and Andy Khatwa (2019)
8. "Introduction to Food Biotechnology" by Perry Johnson-Green (2016)

VI. CO-Curricular Activities

a) **Suggested Co-Curricular Activities**

1. Assignments
2. Seminars, Group Discussions on related topics
3. Awareness on waste water management