

JSS COLLEGE OF ARTS, COMMERCE AND SCIENCE

(An Autonomous College of University of Mysore)

PG DEPARTMENT OF STUDIES AND RESEARCH IN BIO-TECHNOLOGY

Value Added Course

Credit hours-30

Year : 2019-2020

COURSE : BIO-FUELS

SEMESTER : First Semester

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. Describe the functional principle of biofuel technologies in small and large scale.
2. Describe the main steps and components in bioethanol, biodiesel and biogas production.
3. Participate actively in teamwork and work with case related problem solving.

UNIT I

(10 Hours)

Types of biomass (e.g. wood waste, forestry residues, agricultural residues, perennial annual crops, organic municipal solid waste). Composition of lignocellulose (lignin, hemi cellulose, cellulose); energy crops; chemical pretreatment; enzymatic pretreatment; degradation of cellulose; trichoderma cellulases; bacterial cellulases; and comparison with degradation of high starch crops. Sources of energy, introduction of biofuels, availability of bio mass, composition of biomass, terrestrial biomass, aquatic biomass. Physical and chemical properties of biomass. Useful and undesirable features of biofuels.

UNIT II

(10 Hours)

Biogas: The substrate, the digester, the microorganisms, the process of bio gas production, factors affecting bio gas yields, advantages, disadvantages.

Bioethanol: Bioethanol vs. Petrol, production of bio ethanol, ethanol recovery. Bio butanol. Properties and standards of bioethanol. Lignocellulosic biomass composition and characterizations.

UNIT III

(10 Hours)

Sources and processing of biodiesel (fatty acid methyl ester); nature of lipids, especially fatty acids and triglycerides. Sources and characteristics of lipids for use as biodiesel feedstock; and conversion of feedstock into biodiesel (transesterification). Use of vegetable oil (SVO) and waste vegetable oil (WVO). Engineering, economics and environmental issues of biodiesel; major

policies and regulations pertaining to the production, distribution, and use of biodiesel. Comparison of bio diesel with conventional diesel. Standards of bio diesel, current technologies and challenges.