STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN June - November 2024

Department : B.Voc Sustainable Energy Management
Name/s of the Faculty : Dr.B.Keerthana and Dr.R.Vincent Femilaa
Course Title : Bioenergy
Course Code : 23VS/VM/BE36
Shift : II

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	learn the concepts of biomass, its characteristics, classification and assessment.	K1
CO2	understand the significance of biomass energy, urban waste to energy, incineration, Anaerobic fermentation.	K2
CO3	determine the composition of landfill gas, land fill collection system, Aquatic biomass and its resources.	K3
CO4	analyze the biomass conversion techniques, bio products, biogas in India.	K4
CO5	demonstrate the types of biogas plant, comparative study of different types of biogas plant, Advantages and limitations.	K5 & K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jun 19 – 26, 2024 (Day Order 1 - 6)	1	Biomass energy resources and conversion processes 1.1 Definition of Biomass, significance of biomass energy. Biomass Biomass Energy from wood	K1-K6	3	1-5	Board and Chalk method	Group discussion
	2	2.1 Introduction to Incineration: Urban waste – to – energy by incineration process	K1-K6	3	1-5	Board and Chalk method	Group discussion
Jun 27 – July 4, 2024 (Day Order 1 - 6)	1	1.1 Origin of Biomass – Biomass energy resources	K1-K6	3	1-5	Board and Chalk method	Group discussion
	2	2.1 Schematic process of a waste incineration energy plant	K1-K6	3	1-5	PPT and Lecture	(3rd component) Mini model
July 5 – 12, 2024 (Day Order 1 - 6)	1	1.1 Identification of biomass in the environment	K1-K6	3	1-5	Board and Chalk method	Analysis report
	2	2.1 Merits and Demerits, Factors affecting biogas production	K1-K6	3	1-5	Board and Chalk method	Assignment

July 15 – 23, 2024 (Day Order 1 - 6)	1	1.2 Characteristics-methods of determination - proximate analysis and ultimate analysis, Determination of total solids and volatile solids	K1-K6	3	1-5	Board and Chalk method	Practical and demonstration
	2	2.2 Processing of wood and wood waste for incineration plant	K1-K6	3	1-5	Board and Chalk method	Group discussion
July 24 – 31, 2024 (Day Order 1 - 6)	1	1.3. Classification of the Biomass resources – agricultural residues, herbaceous biomass, Woody biomass, vegetable wastes, Assessment of biomass	K1-K6	3	1-5	Board and Chalk method	Assessment of biomass
	2	2.3 Raw biomass materials for conversion to biogas, Agricultural waste and agricultural energy crops	K1-K6	3	1-5	Board and Chalk method	Group discussion
Aug 1 – 5, 2024 (Day Order 1 - 3)	1	1.3 Primary and secondary applications Landfill and other sources of biofuel	K1-K6	2	1-5	Board and Chalk method	Assignment
	2	2.4 Anaerobic fermentation process used in biogas plants	K1-K6	1	1-5	PPT and Lecture	Assignment
Aug 6 – 10, 2024	**C.A. Test – I**						

Aug 12 – 14, 2024 (Day Order 4-6)	3 4	3.1 Landfill gas- Applications of Landfill gas, Composition of landfill gas Biomass conversion techniques and bio products 4.1 Biomass conversion techniques like Electrochemical	K1-K5 K1-K5	1 2	1-5 1-3	Board and Chalk method Board and Chalk method	Group discussion Practical and demonstration
Aug 16 – 23, 2024 (Day Order 1-6)	3 4	3.1 Collection system for landfill Gas 4.1 Thermochemical: Pyrolysis, Gas combustion	K1-K5 K1-K5	3 3	1-5 1-3	Board and Chalk method Board and Chalk method	Group activity Practical and demonstration
Aug 27 – Sep 3, 2024 (Day Order 1-6)	3 4	3.2 Aquatic biomass – Resources of aquatic biomass 4.1 Liquefaction, Biochemical	K1-K5 K1-K5	3 3	1-5 1-3	Board and Chalk method Board and Chalk method	Assignment Practical and demonstration
Sep 4 – 11, 2024 (Day Order 1-6)	3 4	3.2 Algae –water hyacinth –ocean kelp 4.2 Introduction to bio products along with biochar	K1-K5 K1-K5	3 3	1-5 1-3	Board and Chalk method Board and Chalk method	Group presentation Group discussion

Sep 12 - 20, 2024 (Day Order 1-6)	5 4	Biogas Plants 5.1 Biogas plant – types of biogas plants 4.3 Advantages and disadvantages of Biogas	K1-K6 K1-K5	3 3	1-5 1-3	Board and Chalk method Board and Chalk method	Model presentation Group discussion
Sep 23 - 26, 2024 (Day Order 1-4)	5 4	5.1 Floating Dome type biogas plants – KVIC model 4.3 Biogas scenario in India – future prospects.	K1-K6 K1-K5	2 2	1-5 1-3	Board and Chalk method PPT and Lecture	Practical and demonstration (3rd component) PPT presentation
Sep 27 – Oct 3, 2024	**C.A. Test – II**						
Oct 4 – 5, 2024 (Day 5 & 6)	5 4	5.1 PRAGATI model , Ferro cement model Fibre glass reinforced model - Advantages and limitations 4.3 Biogas scenario in India – future prospects.	K1-K6 K1-K5	1 1	1-5 1-3	Board and Chalk method PPT and Lecture	Practical and demonstration PPT presentation
Oct 7 - 15, 2024 (Day Order 1 to 6)	5 5	5.1 Fibre glass reinforced model - Advantages and limitations 5.2 Deenabandhu model – Advantages and limitations	K1-K6 K1-K6	3 3	1-5 1-5	Board and Chalk method Board and Chalk method	Practical and demonstration PPT presentation

Oct 16 - 22, 2024 (Day Order 1 to 6)	5 5	5.2 Fixed dome type- Janata model 5.3 Comparative study of various models of Biogas plants	K1-K6 K1-K6	3 3	1-5 1-5	Board and Chalk method Board and Chalk method	Practical and demonstration (3rd component) Chart making
Oct 23 - 24, 2024 (Day Order 1 to 2)	**REVISION**						

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COURSE PLAN June - November 2024

Department : B.Voc Sustainable Energy Management
Name/s of the Faculty : Dr. P. Anto Christy & Dr. B. Keerthana
Course Title : Waste Segregation and Management
Course Code : 23VS/VM/WM36
Shift : II

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	show different types of waste, waste treatment, processing food waste, types of hazards, resource reduction	K1
CO2	outline the properties of solid waste, incineration, categories of food waste, safety measures, Recycle	K2
CO3	articulate waste minimization, Sanitary landfills, energy generation from food processed waste, Infectious waste, waste reduction	K3
CO4	evaluate recycling municipal waste, solid waste disposal, reduction of BOD and COD in waste water, hazards from genotoxic waste, usage of slurry and vermicomposting	K4
CO5	categorize the color codes of different waste, segregate the waste, properties of waste, waste audit, waste treatment	K5 & K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jun 19 – 26, 2024 (Day Order 1 - 6)	1 & 3	Unit 1 1.1 Definitions; Sources, types, composition, Signs, symbols and color codes for different types of solid wastes Unit 3 3.1 Significance of handling Food processing waste	1-6 1-6	6	1-3 1-4	Chalk and talk Chalk and talk	Question/Answer session Quiz
Jun 27 – July 4, 2024 (Day Order 1 - 6)	1&3	1.2 Types and properties of Solid Waste; Municipal Solid Waste. Domestic wastes, industrial wastes and hazardous wastes 3.2 Categories of waste from fruits and vegetable processing	1-6 1-6	6	1-3 1-4	PPT & lecture Chalk and talk	Question/Answer session Assignment
July 5 – 12, 2024 (Day Order 1 - 6)	1&3	1.2 Bio medical waste, construction waste, E-waste, inert material 3.2 sugar, starch and confectionary, grains, legumes and oilseeds	1-6 1-6	6	1-3 1-4	Chalk and talk Chalk and talk	Interactive Discussion on portions covered Group Discussion
July 15 – 23, 2024 (Day Order 1 - 6)	1 & 3	1.3 Collection, transfer stations; Segregation at the collection centers 3.3 Energy generation from different types of food processing wastes-	1-6 1-6	6	1-3 1-4	PPT & lecture Chalk and talk	Discussion on contents covered

July 24 – 31, 2024 (Day Order 1 - 6)	1&3	1.3 Waste minimization and recycling of municipal waste 3.3 mango peel, citrus, tomatoes, pine apple, banana	1-6 1-6	6	1-3 1-4	Video presentation Lecture	IIIrd Component Assignment Quiz
Aug 1 – 5, 2024 (Day Order 1 - 3)	2 &3	2.1Waste Treatment – Physical, chemical and biological treatment 3.3 reduction of BOD and COD in waste water	1-6 1-6	6	1-5 1-4	Video presentation Lecture	Group project IIIrd Component Assignment
Aug 6 – 10, 2024	**C.A. Test – I**						
Aug 12 – 14, 2024 (Day Order 4-6)	2&5	2.2 Incineration: Classification – batch type 5.1 Waste minimization techniques: Resource Reduction,	1-6 1-6	6	1-5 1-5	PowerPoint presentation Video Presentation	Assignment Quiz
Aug 16 – 23, 2024 (Day Order 1-6)	2&5	2.2 continuous type, measures to mitigate environmental effects 2.3 Sanitary landfills – classification, Types, methods 5.1 Reuse and recycling of wastes-	1-6 1-6	6	1-5 1-5	Lecture PPT and lecture	IIIrd Component Assignment Survey Report
Aug 27 – Sep 3, 2024 (Day Order 1-6)	2&5	2.3 siting consideration, waste land development, leachate and its handling 5.1 Waste minimization audit	1-6 1-6	6	1-5 1-5	PowerPoint presentation Chalk and talk	Group Discussion Quiz

Sep 4 – 11, 2024 (Day Order 1-6)	2&5	2.4 Solid waste Management: Composting 5.2 Domestic waste management 5.2 and plastic waste management	1-6 1-6	6	1-5 1-5	PPT & lecture Chalk and talk	Seminar Mini Project
Sep 12 - 20, 2024 (Day Order 1-6)	2&5	2.4 Aerobic and Anaerobic - Sanitary landfills and size reduction-different approaches to waste management-urban and rural 5.2 Concept of zero waste	1-6 1-6	6	1-5 1-5	Chalk and talk Chalk and talk	IIIrd Component Assignment Problem Solving
Sep 23 - 26, 2024 (Day Order 1-4)	4&5	Unit 4 4.1Overview of hazards; Types of hazards, Health Safety policies 4.2 Potential impact of waste on environment and human health-judicious use of plastics 5.3 Usage of slurry from sewage treatment plant	1-6 1-6	6	1-5 1-5	PPT & lecture Chalk and talk	Group Discussion Quiz
Sep 27 – Oct 3, 2024	**C.A. Test - II**						
Oct 4 – 5, 2024 (Day 5 & 6)	4	4.3 Hazards from: infectious waste and sharps, chemical and pharmaceutical waste, genotoxic waste, Hazards from radioactive waste	1-6	6	1-5	PPT & lecture	Group Discussion and Assignment

Oct 7 - 15, 2024 (Day Order 1 to 6)	5	**5.3** Usage of slurry from sewage treatment plant, vermicomposting	1-6	6	1-5	Chalk and talk	Mind mapping and Quiz
Oct 16 - 22, 2024 (Day Order 1 to 6)	3	3.3 mango peel, citrus, tomatoes, pine apple, banana, reduction of BOD and COD in waste water	1-6	6	1-4	PPT & lecture	Role play and Quiz
Oct 23 - 24, 2024 (Day Order 1 to 2)	**REVISION**						

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COURSE PLAN June - November 2024

Department : B.Voc Sustainable Energy Management
Name/s of the Faculty : Dr.R.Vincent Femilaa and Dr.P.Anto Christy
Course Title : Environment and Ecology
Course Code : 23VS/VA/EN35
Shift : II

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	relate the occurrence of global warming, pollution, basics of ecology, wood structure food security, urbanization, human health and human rights on environmental sustainability	K1
CO2	illustrate climate change, microbial degradation, energy from waste, carbon foot printing and valuing nature and culture to safeguard the environmental values	K2
CO3	identify sustainable development, impacts due to air and water pollution, water related diseases, nutrition health by implementing solutions for energy management	K3
CO4	categorize biomass accumulation, fermentation mechanic, economic policies, environment laws, environment and human health and social justice for sustainable energy	K4
CO5	develop the idea of net energy production by plants and wood, biomass conversion to energy for sustainable environment	K5

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jun 19 – 26, 2024 (Day Order 1 - 6)	1 5	Global climate change 1.1 Introduction- climate change Human rights 5.1 Nutrition health and human rights	K1-K3 K1-K4	3 3	1-3 1-4	Board and Chalk method Board and Chalk method	Group discussion (3rd component) Case study
Jun 27 – July 4, 2024 (Day Order 1 - 6)	1 5	1.1 Global warming, Climate modeling 5.1 Intellectual property rights- community biodiversity registers	K1-K3 K1-K4	3 3	1-3 1-4	Board and Chalk method Board and Chalk method	Group discussion Group discussion
July 5 – 12, 2024 (Day Order 1 - 6)	1 5	1.2 Pollution- Types, causes, consequences and control measures 5.2 Ethics- environmental values	K1-K3 K1-K4	3 3	1-3 1-4	Board and Chalk method Board and Chalk method	Quiz Group discussion
July 15 – 23, 2024 (Day Order 1 - 6)	1 5	1.3 Sustainable development in the context of environmental upkeep 5.2 Valuing nature – valuing culture- social justice – equitable use of resources	K1-K3 K1-K4	3 3	1-3 1-4	Board and Chalk method Board and Chalk method	(3rd component) Assignment Group discussion

July 24 – 31, 2024 (Day Order 1 - 6)	2	Elements of Ecology and Biomass 2.1 Basics of ecology, Inter dependence of different species	K1-K5	6	1-5	Board and Chalk method	Quiz
Aug 1 – 5, 2024 (Day Order 1 - 3)	2	2.1 Basic elements of biomass accumulation, Microorganism types, growth and nutrition	K1-K5	3	1-5	Board and Chalk method	Group discussion
Aug 6 – 10, 2024	**C.A. Test – I**						
Aug 12 – 14, 2024 (Day Order 4-6)	2	2.2 Ecological aspects of microbial degradation, degradation of cellulose	K1-K5	3	1-5	Board and Chalk method	Case study, Practical and Demonstration
Aug 16 – 23, 2024 (Day Order 1-6)	2	2.2 Net energy production by plants, wood structure and wood chemistry	K1-K5	6	1-5	Board and Chalk method	Practical and Demonstration
Aug 27 – Sep 3, 2024 (Day Order 1-6)	3	Environmental & Economic Impacts of Bioenergy 3.1 Principles, Production and assessment of impacts due to air pollution on the environment	K1-K5	6	1-5	Board and Chalk method	Practical and Demonstration
Sep 4 – 11, 2024 (Day Order 1-6)	3	3.1 Principles, Production and assessment of impacts due to and water pollution on the environment	K1-K5	6	1-5	Board and Chalk method	Practical and Demonstration

Sep 12 - 20, 2024 (Day Order 1-6)	3	3.2 Food security and environmental impacts of biomass conversion to energy- energy from waste	K1-K5	6	1-5	Board and Chalk method	Analysis Report
Sep 23 - 26, 2024 (Day Order 1-4)	3	3.3 Economic policies and environmental laws in the Indian context	K1-K5	4	1-5	PPT and Lecture	(3rd component) PowerPoint presentation
Sep 27 – Oct 3, 2024	**C.A. Test - II**						
Oct 4 – 5, 2024 (Day 5 & 6)	4	Human population and the environment 4.1 Global population growth- population explosion, Urbanisation.	K1-K4	2	1-4	PPT and Lecture	Group Seminar
Oct 7 - 15, 2024 (Day Order 1 to 6)	4	4.2 Environment and human health- climate and health, infectious diseases- water related disease	K1-K4	6	1-4	Board and Chalk method	Quiz
Oct 16 - 22, 2024 (Day Order 1 to 6)	4	4.2 Risk due to chemical in food- cancer and environment 4.3 Carbon Foot printing	K1-K4	6	1-4	PPT and Lecture	Assignment
Oct 23 - 24, 2024 (Day Order 1 to 2)	**REVISION**						