



KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Agrl. Engg.) 2022 & Previous admissions
V Semester Final Examinations - January 2025

Fpme.3111

Bio-Energy Systems: Design and Applications (1+1)

Marks: 50
Time: 2 hours

I Fill in the blanks **(10x1=10)**

1. Combustible gas in the biogas is
2. Heat value of biogas is aboutkcal/kg.
3. Producer gas has the impurity ofwhich indeed removal before use in the engines.
4. is floating Dome (Gas holder) type biogas plant.
5.is Fixed Dome (Gas holder) type of biogas plant.
6. The operating temperature for mesophilic bacteria in anaerobic digestion is about°C.
7. A pH value betweenis the best for fermentation and normal gas production.
8. Biogas yield is aboutper kg dry digestible input of cow dung at STP.
9. The optimum thermophilic temperature is around°C.
10. In wet fermentation, digester is filled with water so that the dry matter generally remains less than....%.

II Write short notes on ANY FIVE of the following **(5x2=10)**

1. What is ultimate analysis of biomass?
2. Enlist different characterization parameters of biomass/waste.
3. What is composition of the biogas?
4. What is meant by energy plantation? Enlist the species of trees grown under energy plantation.
5. Enlist different types of wastes utilized for biogas generation as a feed stock material?
6. What are the conditions required for the use of producer gas in the engine?
7. Write down the flow chart of ethanol production from sugar cane.

III Answer ANY FIVE of the following **(5x4=20)**

1. Write down the procedure of proximate analysis.
2. What are the factors which must be considering during site selection for a biogas plant?
3. Explain downdraft gasifier with sketch and its application.
4. What is process of densification? What are the different types of briquetting machines?
5. The following data are given for a family biogas digester suitable for the output of five cows: The retention time is 20 days, temperature 30 °C, dry matter consumed per day = 2 kg, biogas yield is 0.24 m³ per kg. The efficiency of burner is 60%, methane proportion is 0.8. Heat of combustion of methane =28 MJ/m³. Calculate
 - (i) The volume of biogas digester
 - (ii) The power available from the digester
6. What are the modifications required in the SI engine to run on biogas?
7. What is the classification of the gasifiers based on direction of the gas flow, based on output or capacity and type of bed?

IV Write an essay on ANY ONE of the following **(1x10=10)**

1. Advantages and disadvantages of biological conversions.
2. Write in brief on transesterification process.
