Fpme.3111   **Bio-Energy Systems: Design and Applications (1+1)**   Marks: 50
                                                                              Time: 2 hours

I   **Fill in the blanks**   **(10x1=10)**
  1.   Biomass is composed of …………….. such as carbohydrates, lignin, and lipids.
  2.   ………..determines the moisture content, volatile matter, fixed carbon, and ash content of biomass.
  3.   Instrument required for determination of calorific value is …………..
  4.   Producer gas contains ………..
  5.   Water electrolysis is used to produce …………… gas.
         State True or False
  6.   Biogas is produced by a process called biomethanation.
  7.   Calorific value of paddy straw is higher than coal.
  8.   A fuel cell is used to generate electricity from water.
  9.   Cellulose is an organic compound in biomass.
  10. Higher ash content in biomass causes lowering of calorific value.

II   **Write short notes on ANY FIVE of the following**   **(5x2=10)**
  1.   Describe gasification process.
  2.   Write a short note on biomethanation.
  3.   What are benefits of biofuels?
  4.   Describe bio-diesel production process.
  5.   What are different types of briquettes?
  6.   Why lignin is important in briquetting process?
  7.   What is clinker and how is it formed?

III   **Answer ANY FIVE of the following**   **(5x4=20)**
  1.   Write about different pre-treatments for biomethanation of paddy straw.
  2.   Describe factors affecting biogas production.
  3.   What are the advantages and disadvantages of gasification?
  4.   Describe the different components of a briquetting plant.
  5.   Describe all components of proximate analysis process.
  6.   Describe UASB reactor.
  7.   What are the different sources of biofuel?

IV   **Write an essay on ANY ONE of the following**   **(1x10=10)**
  1.   Design a KVIC type biogas plant for a dairy farm having 100 cows. Determine digester, gas holder dimensions and make neat sketch of the whole plant. Calculate gas production rate.
  2.   Describe in details with examples of five routes of energy conversion from crop residues as source material.

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