

**B.Tech Odd Semester (CBCS) Exam.,  
December—2016**

**AGRICULTURAL ENGINEERING**

**( 7th Semester )**

Course No. : AE-704

**( Renewable Energy Sources )**

Full Marks : 75

Pass Marks : 30

Time : 3 hours

- Note :*
1. Attempt **one** question from each Unit.
  2. Begin each answer in a new page.
  3. Answer parts of a question at a place.
  4. Assume reasonable data wherever required.
  5. The figures in the margin indicate full marks for the questions.

UNIT—I

1. (a) Explain different types of biomass. Write their advantages and disadvantages. 7  
(b) Explain the proximate analysis of biomass. 8

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( Turn Over )

2. (a) Explain the direct-type solar dryer. 9  
(b) Define biomass, gasification and densification. 6

UNIT—II

3. (a) Explain the updraft gasifier with neat sketch. Write its advantages and application. 10  
(b) Draw a neat diagram of screw-press briquetting machine. 5
4. (a) Explain the downdraft gasifier with neat sketch. Write its advantages and application. 10  
(b) Draw a neat diagram of piston-press briquetting machine. 5

UNIT—III

5. (a) Explain the KVIC biogas plant with neat sketch. 10  
(b) Write down the application of biogas. 3  
(c) Enlist the different types of biogas plant. 2
6. (a) What are the factors to be considered in selecting the site for biogas plant? 8  
(b) Explain the indirect-type solar dryer with neat sketch. 7

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( Continued )

UNIT—IV

- 7. (a) Explain the working principle of a box-type solar cooker. Explain its construction and working. 9
- (b) Define sun's declination, hour angle and solar azimuth angle. 6
- 8. (a) Explain the working principle of a flat-plate solar water heater. Explain its construction and working. 8
- (b) Explain the solar distillation unit with neat sketch. 7

UNIT—V

- 9. Design a biogas plant for a village consisting of 100 families, each family consisting of 5 persons (adults). Two children are equivalent to 1 person. 15

Village survey report gives the following information about cattles :

Cows	110 nos.
Oxen	130 nos.
Buffalo	50 nos.
Pig	5 nos.

A community biogas plant is to be designed only for cooking and house lighting.

Gas required for cooking/person/day  
= 0.227 m<sup>3</sup>  
Gas required for lighting 100 CP lamp/  
hour = 0.126 m<sup>3</sup>

Each family is allotted 2 lamps, which would burn 2 hours daily.

- 10. (a) Determine the local solar time and declination at a location latitude 23 15 N and longitude 77 30 E at 12.30 IST on June 20. Equation of time correction is given from standard table or chart (1 01 ). 10
- (b) Write down the advantages of briquettes and their applications. 5

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