

PARUL UNIVERSITY
COLLEGE OF AGRICULTURE

B.Sc.(Hons.) Agriculture Summer 2022 - 23 Examination

Semester: 4

Date: 13-03-2023

Subject Code: 20106252

Time: 10:30am to 1:00pm

Subject Name: Renewable Energy and Green Technology

Total Marks: 50

Instructions

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Do as Directed.**A. Fill in the blanks. (Each of 0.5 mark)****(05)**

1. Density of briquettes normally varies between _____ for high pressure processes.
2. _____ gasifier is used for power generation application.
3. _____ Models are fixed dome type biogas plants.
4. Liquid flat plate collectors are generally used for obtaining hot water at temperature less than _____.
5. In the densification _____ efficiency can be increased.
6. _____ Prime source of energy.
7. The gas is available at a variable pressure in _____ type biogas plant.
8. _____ is the key binding agent in high pressure briquetting.
9. To avoid the reverse flow, in solar water heater the top heater of the absorber is kept as stated above _____ below the cold leg fitting on the storage tank.
10. _____ Gasifier is used for the thermal application.

B. Multiple choice type questions. (Each of 0.5 mark)**(10)**

1. The capacity of a solar water heating system can be increased by
 - a) Decreasing collector area
 - b) Increasing capacity of storage tank
 - c) Increasing collector area
 - d) Increasing flow rate
2. A combustible mixture of Producer gas is
 - a) CO₂, NH₃
 - b) H₂, CO
 - c) H₂, CO₂
 - d) CO, NH₃
3. The _____ process removes moisture and helps in preservation of the product.
 - a) cooking
 - b) drying
 - c) sterilization
 - d) distillation
4. Constituent of biogas is
 - a) CH₄ and CO₂
 - b) CH₄, CO₂ and C₂H₆
 - c) CH₄, CO and N₂
 - d) H₂O, CO and NH₄
5. How much Collector area required for 100 liter hot water demand at 50 °C ?
 - a) 1 m²
 - b) 2.5 m²
 - c) 0.5 m²
 - d) 2 m²
6. For the proper biogas generation PH of slurry should be maintain in the range of
 - a) 6.5-7.5
 - b) 7.5-10
 - c) 6.0-8.5
 - d) 5-10
7. Working principle of natural circulation type solar water heating system is
 - a) Thermosyphonic effect
 - c) Naturally flow effect

- b) A & C Both
- d) None of the above
8. Constant gas pressure available in
- a) Floating drum type biogas plant
- b) Batch type biogas plant
- c) Fixed dome type biogas plant
- d) Portable type biogas plant
9. Heart of biogas plant is
- a) Inlet pipe
- b) Mixing Tank
- c) Outlet Pipe
- d) Digester
10. In densification intermediate pressure varies between
- a) 100 MPa – 200 MPa
- b) 5 MPa – 100 MPa
- c) 1 MPa – 5 MPa
- d) 5 MPa – 50 MPa
11. Gasifier convert solid fuel into
- a) Gaseous fuel
- b) Liquid fuel
- c) Solid fuel
- d) Semi-Solid fuel
12. Which models are fixed dome type biogas plants
- a) KVIC
- b) Pragati design model
- c) Janta
- d) Ganesh model
13. Which gasifier is found the most suitable for engine application
- a) Downdraft gasifier
- b) Fluidized bed gasifier
- c) Updraft gasifier
- d) Crossdraft gasifier
14. solar Photovoltaic Technology is the conversion of sunlight into:
- a) Chemical energy
- b) Electricity
- c) Biogas
- d) Geothermal energy
15. A typical silicon PV cell Produces a current about
- a) 0.1-0.5 Volt DC
- b) 1.5-2 Volt DC
- c) 0.6-1 Volt DC
- d) 0.5-0.6 Volt DC
16. The Sun diameter is about _____ times the diameter of the earth.
- a) 109
- b) 110
- c) 111
- d) 112
17. The most favourable orientation, of a collector, is due _____ at an inclination angle to the horizontal equal to the latitude plus 15°.
- a) North
- b) East
- c) South
- d) West
18. A single charge solar lantern can operate the lamp for about _____
- a) 4 – 7 hours
- b) 1 – 8 hours
- c) 4 – 5 hours
- d) 10 hours
19. _____ is the modern day's alternative to the conventional type of perimeter protection.
- a) Solar cooker
- b) Solar lantern
- c) Solar fencing system
- d) Solar street light
20. The solar pond is a simple device for _____.
- a) collecting solar heat
- b) storing solar heat
- c) None of these
- d) Both (a) & (b)

Q.2 Do as Directed.

A. Define the following. (Any five)

1. Gasification

(05)

2. Biomass
3. Pyrolysis
4. Biodiesel
5. Solar cooker
6. Semiconductor
7. Concentration ratio

B. Answer the following. (Any five)

(05)

1. Enlist the different types of biogas plants with different models.
2. Write the sequence of zones in downdraft gasifier with temperature.
3. Write the application of biogas.
4. Enlist the different factors affecting the CH₄ formation.
5. What do you understand about solar refrigeration?
6. Enlist the different site selection criteria for biogas plant.
7. Enlist various application of solar photovoltaic system.

Q.3 Write short notes. (Any five)

(10)

1. KVIC type biogas plant
2. Piston press and screw press type briquetting machine
3. Solar Dryer
4. Solar Desalination unit
5. Solar lighting system
6. PV Cells, Modules and arrays

Q.4 Long Questions/Example (Any three)

(15)

1. Write the difference between Renewable energy and Non-Renewable energy sources.
2. Explain box type solar cooker with diagram, advantages and disadvantages.
3. Explain in detail about the P-type and N-type semiconductor and also write the PN junction formation with neat sketch.
4. Explain in detail about the Flat plate type collector with neat sketch and also write the advantages and disadvantages of solar water heater.