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Sardar Patel University

M.Sc. Renewable Energy

Semester : First **Course Code:** PS01CREN03

Course Title: Geothermal Energy and Biomass Energy

Date: Thursday, 27.10.2016 **Time:** 10:00 AM to 1:00 PM

Total Mark: 70

Note: **1. All the questions are compulsory**
2. Figures on the right bracket indicated marks

Que. 1: Select the suitable Answer **9 Marks**

i. The thermal energy content in the interior of the earth is called.....
   a. Nuclear Energy
   b. Wave Energy
   c. Geothermal Energy
   d. Magma

ii. The main compositions of biogas are.....
   a. CH_4 and H_2
   b. H_2 and SO_2
   c. CH_4 and N_2
   d. CH_4 and CO_2

iii. The average increase in temperature of earth with increasing depth is called as .....
   a. Energy storage
   b. Geothermal gradient
   c. Geothermal heat
   d. Ambient temperature

iv. In, Vapor dominated geothermal power plant ..... is used to separate particulate matter
   a. Centrifugal Separator
   b. Bag Filters
   c. Flash steam separator
   d. Gravity separators

v. The ..... is used as working fluid for binary cycle system in geothermal power plant
   a. *n*-Butanol
   b. Propylene carbonate
   c. Isobutene (2-methyl propane)
   d. Iodine

vi. The optimum pH for biogas generation is in the range of .....
   a. 6.5 -7.5
   b. 5.2-8.5
   c. 7-9
   d. 3.5 -6.5

vii. Generally ..... is used as conversion system in geothermal electric power plants
   a. Turbine
   b. Furnace
   c. Diesel Genset
   d. Boiler

viii. The formation of plants takes place by the process of .....
   a. Pollination
   b. Hydrolysis
   c. Photosynthesis
   d. Fermentation

ix. The average gas yield from the cow dung is ..... m^3/kg
   a. 0.036
   b. 0.045
   c. 0.07
   d. 0.056

Que. 2: Answer **Any Seven** the following questions in brief **(3 marks each)** **21 Marks**

i. Define geothermal energy and give different forms of geothermal resources

ii. How production well and injection well works.

iii. What are the different applications of the geothermal energy and engineering criteria for resources for Geothermal Power Plant?

iv. Give advantages and disadvantages of petro geothermal power plant

v. What are the criteria for site selection for biogas plant

vi. Give the advantages and disadvantages of floating dome biogas plant

vii. Explain geopressure geothermal resources with suitable diagram

viii. The fallowing data are given for family size biogas digester suitable for output of five cows. The retention time is 20 days, temperature 30 °C, dry matter consumed per day = 2 kg. The efficiency of the burner is 60 %. Methane proportion is 0.8. Heat of combustion of methane= 28 MJ/m^3.

ix. What are the advantages of anaerobic digestion?

x. Draw diagram of floating dome biogas plant with nomenclature

Que. 3: A) Explain hot dry rock geothermal resources with suitable diagram **5 Marks**

B) Explain the origin of hydro geothermal resource with suitable diagram **5 Marks**

OR

Explain the techniques used to make fracture cavity in petro geothermal resource

Que. 4: A) Explain binary cycle liquid dominated geothermal electric power plant with suitable diagram **5 Marks**

B) Explain liquid dominated double flashed geothermal electric power plant with suitable diagram **5 Marks**

OR

Give the detailed classification and types of geothermal power plants

Que. 5: A) Define biomass. Explain the origin of biomass by process of photosynthesis **5 Marks**

B) Explain the fermentation process, its products, properties of product and its applications **5 Marks**

OR

What are the different processes of biomass conversion and their end products obtained from biomass conversion?

Que 6: A) Explain fixed dome Deenbandhu biogas plant with suitable diagram **5 Marks**

B) Explain the process (phases) anaerobic digestion in details used in biogas plant **5 Marks**

OR

Give the classification of the biogas plant. Explain single stage and two stage digestion process with suitable diagram

—— X (2) —— X ——