Printed Page:- Subject Code:- ABT0513

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech.

SEM: V - THEORY EXAMINATION (2022 - 2023)

Subject: Bioenergy Technologies and Systems

Time: 3 Hours Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION A 20

1. Attempt all parts:-

1-a. Bioethanol is produced by fermenting the _____ and starch components (CO1) 1

(a) Acid

(b) Milk

(c) Sugar

(d) Alcohol

1-b. Biomass can be converted to liquid fuel at high temperatures by the process.....(CO1) 1

(a) Pyrolysis

(b) Gasification

(c) Sublimation

(d) None of the above

1-c. Ethanol is generally produced from the fermentation of C6 sugars (mostly glucose) using classical or GMO yeast strains such as _____(CO2) 1

(a) E. coli

(b) Sacharomyces cerevisiae

(c) Enterobacter aerogenes

(d) Pichia pastoris

1-d. Algal biomass is used to produce biofuels called _____(CO2) 1

(a) First generation biofuels

(b) Second generation biofuels

(c) Third generation biofuels

(d) None of the above

1-e. _____ are polymers that are produced by or derived from living organisms, such as plants and microbes, rather than from petroleum, the traditional source of polymers. (CO3) 1

(a) biopolymers

(b) biocompounds

(c) biopigments

(d) None of the above

1-f. Bioethanol is mixed with _____ to synthesize transport fuel. (CO3) 1

(a) kerosene

(b) diesel

(c) oil

(d) Petrol

1-g. Biomass can be converted to _____(CO4) 1

(a) biodiesel

(b) biogas

(c) ethanol

(d) all of the above

1-h. This is an example of starch crops biomass feedstocks. (CO4) 1

(a) corn stover

(b) wheat straw

(c) orchard prunings

(d) sugar cane

1-i. When more than five variables are to be accessed _____ design can be used. (CO5) 1

(a) Stowe-Mayer

(b) Greasham-Inamine

(c) Bull-Hicks

(d) Plackett-Burman

1-j. _____ is the process of looking for the most optimal hyperparameters by checking whether each candidate is a good match. (CO5) 1

(a) RSM

(b) Gradient descent protocol

(c) Exhaustive search

(d) None of these

2. Attempt all parts:-

2.a. Write a short note on bioenergy production. (CO1) 2

2.b. What do you understand by third generation biofuels? (CO2) 2

2.c. Define the parameter which is used to assess biorefinery performance. (CO3) 2

2.d. Write short note on pyrolysis. (CO4) 2

2.e. Write short note on feedstocks with examples. (CO5) 2

SECTION B 30

3. Answer any five of the following:-

3-a. What do you mean by advanced liquid fuels? Discuss any five Advanced liquid biofuels. (CO1) 6

3-b. Explain the concept of carbon neutral production of biodiesel. (CO1) 6

3-c. Describe the bio-pathway for the production of second generation biofuels. (CO2) 6

3-d. Discuss in detail the impact caused by agricultural solid waste on human health and ecology. (CO2) 6

3.e. What do you understand by the concept of biorefinery? How biofuels can be synthesized from waste water? (CO3) 6

3.f. Write various aspects of enzymatic hydrolysis in detail. (CO4) 6

3.g. Discuss about Plackett-Burman Design of media optimization. (CO5) 6

SECTION C 50

4. Answer any one of the following:-

4-a. What do you understand by the concept of biopower? Describe any three ways used for biopower generation. (CO1) 10

4-b. Discuss various methods of biomass production in detail. Describe the various ways by which the carbon mass balance can be employed. (CO1) 10

5. Answer any one of the following:-

5-a.	Discuss in detail about first, second and third generation biofuels. (CO2)	10
5-b.	Discuss various attributes of forestry waste with examples. Describe the method to analyze forestry waste. (CO2)	10

6. Answer any one of the following:-

6-a.	Comment on how the biopolymers can be differentiated from chemical polymers. Draw the schematic diagram for the production of biopolymers. (CO3)	10
6-b.	What do you understand by circular bioeconomy? Write five different value added products which can be formed from biomass. (CO3)	10

7. Answer any one of the following:-

7-a.	Discuss the concept of thermochemical conversion. How gasification and pyrolysis contributes in thermochemical conversion? (CO4)	10
7-b.	What do you understand by anaerobic digestion? Draw a schematic diagram of biogas plant and discuss its components. (CO4)	10

8. Answer any one of the following:-

8-a.	Explain with flowchart for modelling bioenergy pathway using SuperPro software. (CO5)	10
8-b.	Explain genetic algorithms, gradient descent and exhaustive search approach for optimization strategy. (CO5)	10