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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: Bioprocess Engineering

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. Energy from food comes as (CO1) 1
- (a) ATP
- (b) ADP
- (c) ACP
- (d) None of these
- 1-b. Which condition is correct according to the growth of cells in beginning?(CO1) 1
- (a) Cells are in small amount
- (b) Cells are in medium amount
- (c) Cells are in large amount
- (d) Cells are negligible in amount
- 1-c. Up to what temperature does the enzymes of thermophilic organisms stay active?(CO2) 1
- (a) 90°C
- (b) 40°C
- (c) 35°C

- (d) 200°C
- 1-d. The coenzyme is: (CO2) 1
- (a) Often a metal
 - (b) always a protein
 - (c) often a vitamin
 - (d) always an inorganic compound
- 1-e. _____ is the part of a bioreactor helping in maintaining the homogeneity of the contents of the bioreactor. (CO3) 1
- (a) Agitator
 - (b) Fan
 - (c) Cooler
 - (d) Coolant
- 1-f. For thorough mixing of medium and inoculum the part of fermenter useful is (CO3) 1
- (a) Shaft
 - (b) Headspace
 - (c) impeller
 - (d) sparger
- 1-g. Biodiesel is produced from oils or fats using (CO4) 1
- (a) fermentation
 - (b) transesterification
 - (c) distillation
 - (d) none of the above
- 1-h. The production of bio ethanol is by fermenting the _____ and starch components. (CO4) 1
- (a) Acid
 - (b) Milk
 - (c) Sugar
 - (d) Alcohol
- 1-i. Which of the following are the recommended heat temperature and time periods for the moist heat sterilization method used in an autoclave? (CO5) 1
- (a) 180 c for 5 minutes
 - (b) 121 c for 15 minutes

(c) 126 c for 3 minutes

(d) 160 c for 45 minutes

1-j. Nonionizing radiation and ionizing radiation are sterilization methods mainly used in hospitals. Ultraviolet radiation is one example of nonionizing radiation, name the ionizing radiation? i(CO5) 1

(a) Infrared

(b) X-rays and gamma rays

(c) Halogens

(d) Ethylene oxide

2. Attempt all parts:-

2.a. What is cryptic growth?(CO1) 2

2.b. What is active site?(CO2) 2

2.c. What is solid state fermentation?(CO3) 2

2.d. How many amino acids does human insulin contain?(CO4) 2

2.e. Name the different method of sterilization?(CO5) 2

SECTION B 30

3. Answer any five of the following:-

3-a. What are the different direct and indirect methods of quantifying cell number density? (CO1) 6

3-b. How can you determine cell number density? Discuss in detail?(CO1) 6

3-c. Write the difference between enzyme catalysts and chemical catalysts?(CO2) 6

3-d. With the help of suitable diagram discuss about the lock and key model of enzyme catalysis? (CO2) 6

3.e. Draw a schematic diagram of solid-state fermentation? (CO3) 6

3.f. Write any seven applications of bioprocess engineering? (CO4) 6

3.g. Discuss in detail about the essential parameters that need to be considered while operating a bioreactor?(CO5) 6

SECTION C 50

4. Answer any one of the following:-

4-a. Draw and explain microbial growth curve with different phases?(CO1) 10

4-b. Explain quantitative analysis of microbial growth by direct and indirect methods?(CO1) 10

5. Answer any one of the following:-

- 5-a. Diagrammatically explain about the internal and external biomass feedback in detail?(CO2) 10
- 5-b. What is enzyme immobilization? What type of materials are used for enzyme immobilization? Discuss their properties?(CO2) 10
6. Answer any one of the following:-
- 6-a. Explain scale-up process of a bioreactor? Also discuss about the different parameters that must be considered during the scale-up of a bioreactor?(CO3) 10
- 6-b. Explain scale-down process of a bioreactor? Also discuss about the different parameters that must be considered during the scale-down of a bioreactor?(CO3) 10
7. Answer any one of the following:-
- 7-a. With the help of schematic diagram, discuss about the different stages of bioprocess development?(CO4) 10
- 7-b. Explain briefly about penicillin production?(CO4) 10
8. Answer any one of the following:-
- 8-a. Explain briefly about continuous sterilization with their advantages and disadvantages? (CO5) 10
- 8-b. What are the different methods for fermentation process optimization?(CO5) 10