Printed Page:- **Subject Code:- ABT0502**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: V - CARRY OVER THEORY EXAMINATION - APRIL 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. What are the extrinsic factors for the microbial growth? (CO1) 1

(a) humidity

(b) storage temperature

(c) composition of gas phase

(d) all of these

1-b. Exponential phase of growth curve of bacteria is of limited duration because of (CO1) 1

(a) rise in cell density

(b) accumulation of toxic metabolites

(c) exhaustion of nutrients

(d) all of these

1-c. How does a catalyst increase the rate of a reaction?(CO2) 1

(a) By forming an intermediate complex

(b) By increasing activation energy

(c) By lowering the activation energy

(d) By changing equilibrium constant

1-d. An uncatalyzed reaction involved: (CO2) 1

(a) High activation energy

(b) Low activation energy

(c) Balanced activation energy

(d) All of these

1-e. What do you mean by 'scale-down'?(CO3) 1

(a) Decreasing the scale of fermentation

(b) Increasing the scale of fermentation

(c) Decreasing the rate of agitation

(d) Increasing the rate of fermentation

1-f. Flow in pipes is laminar if Reynold number is (CO3) 1

(a) less than 2100

(b) more than 3000

(c) between 2100 and 3000

(d) none of these.

1-g. According to the central dogma, which of the following represents the flow of genetic information in cells?(CO4) 1

(a) protein to DNA to RNA

(b) DNA to RNA to protein

(c) RNA to DNA to protein

(d) DNA to protein to RNA

1-h. Which of the following changes occur during first phase of growth of Penicillium chrysogenum? (CO4) 1

(a) Growth of mycelia occurs

(b) Ammonia is liberated in the medium

(c) Lactic acid present in the corn steep liquor is utilized at the maximum rate

(d) All of the above

1-i. The highest feasible temperature for batch sterilization is _____ (CO5) 1

(a) 120°C

(b) 121°C

(c) 130°C

(d) 131°C

1-j. According to BP, the pressure inside autoclave to reach a temperature of 121oC must be? (CO5) 1

(a) 5 lb/in2 above atmospheric pressure

(b) 10 lb/in2 above atmospheric pressure

(c) 15 lb/in2 above atmospheric pressure

(d) 0 lb/in2 above atmospheric pressure

2. Attempt all parts:-

2.a. What is the major difference between nephelometry and turbidimetry?(CO1) 2

2.b. Define dilution rate?(CO2) 2

2.c. What do you mean by scale up of bioreactor?(CO3) 2

2.d. What is central dogma?(CO4) 2

2.e. What is the full form of RSM?(CO5) 2

SECTION B **30**

3. Answer any five of the following:-

3-a. Discuss in detail about the direct methods of determining cell number density?(CO1) 6

3-b. Derive the equation for microbial growth kinetics with graph?(CO1) 6

3-c. With the help of suitable graph discuss about the effect of temperature on enzyme activity?(CO2) 6

3-d. With the help of labelled diagram discuss about perfusion culture in detail?(CO2) 6

3.e. Discuss in detail about diffusion theory?(CO3) 6

3.f. Discuss about the downstream process of antibiotic production?(CO4) 6

3.g. Discuss in detail about the factors that are necessary in any sterilization protocol?(CO5) 6

SECTION C **50**

4. Answer any one of the following:-

4-a. Elaborate different phases of microbial growth curve along with a suitable diagram?(CO1) 10

4-b. Illustrate the working mechanism of particle counter in detail?(CO1) 10

5. Answer any one of the following:-

5-a. Draw flow sheet for chemostat cascade. Explain the process in detail?(CO2) 10

5-b.	With the help of equations discuss about the substrate utilization and product formation in bioreactor?(CO2)	10

6. Answer any <u>one</u> of the following:-

6-a.	What do you understand by solid-state fermentation? Write its applications and advantages?(CO3)	10
6-b.	Consider the scale-up of a fermentation from a 10 l to 10,000 l vessel. The small fermenter has a height-to-diameter ratio of 3. The impeller diameter is 30% of the tank diameter. Agitator speed is 500 rpm and three Rushton impellers are used. Determine the dimensions of the large fermenter and agitator speed for:(CO3) a. Constant P/V b. Constant impeller tip speed c. Constant Reynolds number	10

7. Answer any <u>one</u> of the following:-

7-a.	What are the different steps of antibiotic production?(CO4)	10
7-b.	Discuss in detail about the refining and packaging of antibiotics? How does the antibiotic quality is controlled?(CO4)	10

8. Answer any <u>one</u> of the following:-

8-a.	Explain in detail about the different methods for fermentation process optimization?(CO5)	10
8-b.	What do you understand by medium optimization? What are the different approaches for medium optimization?(CO5)	10