Ref. No. : Ex/FTBE/PC/B/T/311/2024(S)

B.E. FOOD TECHNOLOGY AND BIOCHEMICAL ENGINEERING THIRS YEAR FIRST SEMESTER SUPPLEMENTARY EXAM-2024

BIOCHEMICAL ENGINEERING-1

Time: 3 hrs | Full Marks: 100

Part-I

Use Separate Answer scripts for each Part

GROUP-A

Answer any one question **10×1 = 10**

1. Briefly describe different cell disruption methods.
2. Derive the equation of filtration rate, when filter cake is non compressible.

GROUP-B

Answer any two questions 20×2 = 40

3. (a) Derive terminal velocity of a suspended particle in laminar flow condition.
   (b) Yeast cells are recovered from a fermentation broth by using a tubular centrifuge. Sixty percent (60%) of the cells are recovered at a flow rate of 12 l/min with a rotational speed of 400 rpm. Recovery is inversely proportional to flow rate.
   (i) to increase the recovery of cells to 95% at the same flow rate, what should be the rpm of the centrifuge?
   (ii) At a constant rpm of 4000 rpm, what should be the flow rate to result in 95% cell recovery? 8+12 = 20
4. (a) What are the different types of chromatography system?
   (b) Biomass present in fermentation broth is to be separated by vacuum filtration. Filter and broth characteristics are given below:
   $A = 50\ m^2$; $\Delta P = 0.01\ N/m^2$; $C = 15\ kg / m^3$, $\mu = 0.003\ kg/m.s$; $\alpha = 2\ m/kg$ 8+12 = 20

5. Write short note on any four 5×4 = 20

(i) Reverse osmosis
(ii) Dialysis
(iii) Aqueous Two phase extraction
(iv) Coagulation and flocculation
(v) Centrifugal coefficient and its significance
(vi) Genetically modified food

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B.E. FOOD TECHNOLOGY AND BIO-CHEMICAL ENGINEERING

THIRD YEAR FIRST SEMESTER SUPPLEMENTARY EXAM 2024

BIOCHEMICAL ENGINEERING- I

Time: 3 hrs. Full Marks : 100

Part – II (50 Marks)

Answer any four of the flowing questions (12.5 x 4 = 50)

What is 'specific growth rate' and what is its dimension? Draw the general bacterial growth curve and mention different phases. What do you mean by 'generation time'? What is the importance of 'lag phase'? What do you mean by 'k_d' and what is its unit? (2+1) + 3+2+2+ (1.5+1)

Name two substrates and two organisms popularly used in solid state fermentation. Write six major differences between solid SSF and SmF. Write four disadvantages of batch fermentation. Mention four fundamental differences between batch and continuous culture. What is 'yield coefficient'? 3 + 3+ 2+2.5+2

'Solid media' are more versatile in usage-why? What do you mean by 'selective media'? Cite one example of it. Write the difference between sterilization and disinfection. What is the condition of lab-sterilization using moist heat? Write the advantages of continuous sterilization over batch sterilization. What do you mean by 'Del factor'? 2+2.5+2+2+2+2

Draw neat sketch of a continuous steam injector type direct sterilization system and explain its mode of action. Write the equation to relate 'time', 'temperature' and 'Del factor'. A pilot sterilization is carried out in a 1000dm^3 vessel with a medium containing 10^6 organism per cc, requiring a probability of contamination of '1 in 1000'. What will be the "del factor' value in this case? 6+2+4.5

Write the differences between 'surface filtration' and 'depth filtration'. Mention the names of mechanisms by which sterilization is achieved in 'fibrous filtration' medium. What do you mean by 'nucleopore membranes'? Give example of each of ionizing and non-ionizing radiation sterilization. Give example of each of liquid and gaseous chemical sterilizer. The D_{121} value for a microbe is 0.2 min. What time will be required to reduce its count in a sample from 10^{12} to one at 121°C? 2+2+2+2+2+2.5