LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **FOOD CHEMISTRY AND FOOD PROCESSING**

THIRD SEMESTER – **NOVEMBER 2024**

PFP3ID01 – FOOD BIOTECHNOLOGY

Date: 16-11-2024 Dept. No. Max. : 100 Marks

Time: 01:00 pm-04:00 pm

	SECTION A – K1 (CO1)
	Answer ALL the questions **(5 x 1 = 5)**
1	**Choose the best option**
a)	Which type of fermentation is characterized by the growth of microorganisms on solid substrates without the presence of free-flowing liquid? i) Submerged Fermentation ii) Solid-State Fermentation iii) Photobioreactor Fermentation iv) Air Lift Fermentation
b)	Which technique is utilized to separate proteins from a solution based on their affinity to a stationary phase and their interaction with different solvents? i) Electrophoresis ii) Precipitation iii) Chromatographic Techniques iv) Ultra Filtration
c)	Which process is primarily used to remove water from a product to increase its shelf life and ensure stability? i) Crystalization ii) Drying iii) Sedimentation iv) Storage
d)	Which of the following is a potential concern associated with the use of rBST in dairy cows? i) Increased risk of antibiotic resistance ii) Alteration of milk's nutritional content iii) Higher incidence of mastitis in cows iv) Reduced growth rate in calves
e)	In FISH, what is used to detect the target DNA sequence? i) Radioactive isotopes ii) Fluorescently labeled probes iii) Enzyme-linked antibodies iv) Chemically tagged proteins
	SECTION A – K2 (CO1)
	Answer ALL the questions **(5 x 1 = 5)**
2	**Answer in one or two sentences**
a)	Which type of bioreactor is specifically designed to enhance the growth of microorganisms by maintaining a liquid culture with a high surface area-to-volume ratio?
b)	Define crystallization.
c)	What is biotransformation, and which types of cells are used in biotransformation processes?
d)	Define genetically engineered chymosin.
e)	What is a microarray?

	SECTION B – K3 (CO2)
	Answer any THREE of the following **(3 x 10 = 30)**
3	Illustrate the differences between submerged fermentation and solid-state fermentation.
4	Enumerate the filtration, centrifugation and liquid-liquid extraction, discuss their applications, advantages, and limitations.
5	Discuss the role of scale-up and scale-down processes in fermentation.
6	Explain the role of genetic engineering techniques in enhancing the expression of the cholera vaccine in potato plants.
7	Apply pyrosequencing technique to analyze a food sample suspected of contamination with Salmonella.
	SECTION C – K4 (CO3)
	Answer any TWO of the following **(2 x 12.5 = 25)**
8	Describe the operations and applications of Stirred Tank Bioreactor and an Air Lift Bioreactor.
9	Examine the differences in design and functionality between laboratory-scale and industrial-scale Solid-State Fermentors (SSF).
10	Design a biotransformation process using microbial cells to carry out a hydroxylation reaction on an organic compound.
11	Analyze the advantages of using phage-based assays over traditional culture-based methods for pathogen detection in food samples.
	SECTION D – K5 (CO4)
	Answer any ONE of the following **(1 x 15 = 15)**
12	Explain the biochemical reactions involved in biotransformation of microbial cells.
13	Evaluate the potential risks and benefits of using genetically engineered tryptophan in the food and pharmaceutical industries.
	SECTION E – K6 (CO5)
	Answer any ONE of the following **(1 x 20 = 20)**
14	Evaluate a proposed biotransformation process that uses both microbial and plant cells to convert a specific substrate into a target product.
15	Design a biotransformation process for producing vanilla using a specific strain of microorganism, outlining the steps involved and how you would optimize the process?
