U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Biotechnology **Duration: 3 hrs.**
Course Code: 23BT5PEFMB / 22BT5PEFMB **Max Marks: 100**
Course: Food Microbiology **Semester: V**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	*CO*	*PO*	Marks
1	a)		Compare and contrast the nature of microflora that sustain in air and soil environments. Highlight the major factors that are responsible for their survival in those habitats.	*CO1*	*PO 1,2*	**10**
	b)		A fresh fruit pulp is always prone to spoilage by the microorganisms when compared to egg powder. i. Mention the primary factor in the meat that is responsible for spoilage. ii. Discuss the ways of processing to reduce the mentioned primary factor to increase the shelf life of the food.	*CO1*	*PO1, 2*	**5**
	c)		Two food items namely fresh meat and vegetable are provided. The meat has *Clostridium botulinum* in permissible limits while the vegetable has *Pseudomonas aeruginosa* in permissible limits. The two food items has to be packed separately in a gaseous atmosphere to stop further proliferation of microbes mentioned. i. Which physiological factor do you consider while deciding on the gaseous atmosphere to be used and why? ii. Discuss the respective gaseous atmosphere to be used for the mentioned food items with suitable reasons.	*CO1*	*PO1, 2*	**5**
			OR			
2	a)		How do animals serve as major sources of microorganisms leading to food spoilage? Highlight the importance of humans and their activities being the possible potential sources of microbes.	*CO1*	*PO1, 2*	**10**
	b)		The fruits and vegetables are found to possess equal amounts of the bacteria namely *B.psychrophilus, E.coli* and *Thermus aquaticus.* *i.* Mentions the common physiological factors associated with above mentioned bacteria in foods and show the differences among them with a graphical plot.	*CO1*	*PO1, 2*	**5**

			ii. What is the big challenge for a food industry when such microbial consortia are found in a food and why?			
		c)	The partially dried foods namely cheese and dry fruits were stored in a room with 95% RH while the fruits and vegetables stored in a room with RH of 45%. i. What is RH and infer its relation with the growth and development of microbes. ii. What will be the effect on the quality of the foods mentioned above in such RH conditions?	*CO1*	*PO1, 2*	**5**
			UNIT II			
	3	a)	A raw milk sample soon after drawn from the cow in an open area was transferred to storage room maintained at 10 ^{o}C. The milk sample was kept for 24 hours before processing. When it was further processed it was observed that the milk had solid clumps and it was sour in taste with foul smell. The investigations revealed that there were very least number of LAB which are the natural microflora of milk. i. What could be responsible for the undesirable spoilage symptoms in the milk and trace the sources. ii. When the same milk was held at 45-50 ^{o}C later there was butyric acid. Justify. iii. Infer suitably with specific biochemical actions for the undesirable organoleptic properties of the milk.	*CO2*	*PO2, 6*	**10**
		b)	How proteins of a food could be processed by spoilage microbes to produce undesirable properties in food. Support your answer with specific biochemical reactions.	*CO2*	*PO2, 6*	**5**
		c)	Fungal contamination of fruits is most common leading to deterioration of surface texture. Justify.	*CO*	*PO*	**5**
			OR			
	4	a)	Soon after slaughter an intact fresh meat taken out from the lower region of abdomen was handled properly with good hygienic practices and transferred to store room maintained at around 25-30 ^{o}C. The meat was kept there for two days before processing. Further when meat was sliced to further process it there was rancid smell, slime layers and the pH of the meat fluid was 3.5 though the texture of the meat was intact and undisturbed. i. What may be responsible for the undesirable organoleptic properties shown in the meat and identify the suitable sources and factors that led to contamination. ii. Why the texture was intact and no signs of deterioration. iii. Provide suitable biochemical actions behind such symptoms of spoilage.	*CO2*	*PO2, 6*	**10**
		b)	Egg is considered to be a complete nutritional diet. Justify suitably considering the composition of eggs.	*CO2*	*PO2, 6*	**5**

		c)	Explain the symptoms of spoilage that frequently observed with poultry meat along with the possible sources.	*CO2*	*PO2, 6*	**5**
			UNIT-III			
	5	a)	This organism is known to cause infectious abortion in sheep and cattle. The organism exhibits pleomorphic structural features. Identify the organism, mention its salient features, pathogenesis, symptoms and the foods with which it is associated. Also highlight a suitable case study with respect to its outbreak.	*CO3*	*PO2, 5*	**10**
		b)	Two strips of the Petrifilm were used for sampling the two different places in a food industry with dimension of 5 cm^2. The total number of colonies counted on the films are 115 and 75. The growth area of plate was 15cm^2. Calculate the surface colony number. Infer with suitable reason whether the experimental numbers and result obtained is reliable when you consider large working area in industry.	*CO3*	*PO2, 5*	**5**
		c)	Passive monitoring of air in a typical food industry resulted in appearance of 150 colonies on a plate upon exposure for a duration of 2 hour. The same was reported by the food industry as quantitative data in the QA report. i. Is the quantitative report generated is right? Justify suitably. ii. Based on your decision provide the working principle of the technique.	*CO3*	*PO2, 5*	**5**
			OR			
	6	a)	Assume that a processed meat sample was known to contain the bacteria namely *C.botulinum* and *S.typhi.* Both the organisms co-exist together and are in equal number. But these organisms are present in far less number (around 10 fold less) compared other organisms. Both organisms have the ability to target the nutritional components and degrade them leading to undesirable properties. i. What is the big constraint with respect to isolation of organisms? Justify ii. How do you increase the population of both the bacterial species for further isolation? iii. Design a selective isolation procedure to exclusively isolate and detect *S.typhi*.	*CO3*	*PO2, 5*	**10**
		b)	Write the principle and procedure of RRT. Give the standard chart for quality assessment of the sample.	*CO3*	*PO2, 5*	**5**
		c)	How *Escherichia coli* 0157:H is different from *E.coli*. Mention the pathogenesis and symptoms.	*CO3*	*PO2, 5*	**5**
			UNIT - IV			
	7	a)	Discuss the LAB as an excellent probiotic organism with a neat flow chart of industrial production.	*CO2*	*PO2, 6*	**10**
		b)	Write briefly on *Saccharomyces cerevisiae* functioning as baker's yeast with its production.	*CO1*	*PO1*	**5**

		c)	The grapes with intense pigmentation were taken from cooler regions of the world for further processing into wine. The initial tests of the raw material showed the grapes to be of highly acidic of around pH 2.0 i. Are such grapes are ideal to be processed for wine production in all parts of the world? Justify. ii. If such high acidity is not deserved, provide the solution to reduce the same to produce palatable good wine.	*CO2*	*PO2, 6*	**5**
			OR			
	8	a)	Describe the procedure for industrial production of beer from the sprouted barley through a neat flow chart. Assume that the following interruptions were happened to the production steps. A. The kilning process was done at a temperature of 37 ^{o}C for a duration of one hour before proceeding to next step. B. The Lautering step is avoided during the preparation of wort. C. The boiled and clarified wort immediately subjected for fermentation by adding the strains of *S. cerevisae*. D. Do you expect any negative impact of these interruptions on the final quality of the beer. Justify suitably.	*CO2*	*PO2, 6*	**10**
		b)	An industrial microbiologist was provided with alone raw milk free from LAB and given the culture of *P.roqueforti* and was asked to start production of cheese. Will the person be able to produce the cheese of fine quality? Justify suitably.	*CO3*	*PO2, 5*	**5**
		c)	Comment on Malo-Lactic fermentation and its importance.	*CO1*	*PO1*	**5**
			UNIT V			
	9	a)	Describe the gamma radiations as an excellent source of sterilizing agent for foods.	*CO2*	*PO2, 6*	**10**
		b)	With a neat diagram, explain the continuous air blast freezer.	*CO2*	*PO2, 6*	**5**
		c)	Differentiate Pasteurization from Pascalisation.	*CO2*	*PO2, 6*	**5**
			OR			
	10	a)	What is food freezing curve. Take a suitable food system and pure water and assess the deviations in the graphical plot with inference on role of food molecules.	*CO2*	*PO2, 6*	**10**
		b)	Mention the deleterious effects of gamma irradiation on the foods.	*CO2*	*PO2, 6*	**5**
		c)	Comment on the role of refrigeration in food preservation and microbes that overcome it.	*CO2*	*PO2, 6*	**5**

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