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

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: VI**

Branch: Biotechnology **Duration: 3 hrs.**

Course Code: 23BT6PEAFC / 22BT6PEAFC **Max Marks: 100**

Course: Advances in Food Chemistry

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)	Following two food items are given with unique properties. Food sample 1: A grounded meat in water suspension exhibits varying physical property of increase in size and overall volume upon alteration of pH. The meat tends to swell at particular pH values. Food sample2: A similar grounded meat was suspended in water and was agitated rigorously during cooking temperature of 90-100 ^{o}C. The result of such treatment is different appealing physical property formed at the surface. i. Name the physical property responsible for the result of different organoleptic qualities in the food samples. And which principal component of the meat is responsible for the property? Justify suitably. ii. Describe with the help of graphical representation and diagram the principle mechanism of such physical properties.	*CO1*	*PO1, PO2*	**10**
	b)	Minerals constitute one of the essential food components in our daily diet. Justify with suitable examples.	CO1	*PO1*	**5**
	c)	Classify the vitamins based on the solubility and discuss the properties and importance of one vitamin under each class.	CO1	*PO1*	**5**
		OR			
2	a	"Carbohydrates forms one of the major food components that contribute to various organoleptic qualities of the food". Discuss the statement.	CO2	*PO1*	**10**
	b)	A fat enriched food (a Chocolate) tends to be more stable when stored under reduced temperature of less than 0 ^{o}C but use to collapse in its texture when stored at above room temperature. Which property of the food component is responsible for this undesirable property and discuss the same.	CO2	*PO2, PO3*	**5**

		c)	Following two food items were served having different flavors. Food sample 1: a vegetable soup with carrot as predominant was subjected to heat treatment of 70-80 ^{o}C for half an hour. The soup suspension was cooled and carrot extract powder was added before serving the soup. Still the flavor was not equal to that of natural ones. Food sample 2: A vanilla ice-cream was prepared using the chemically synthesized vanillin and was added at the same concentration to that of naturally existing one. Still the flavor was significantly different. i. Cite the reason for adding the flavors externally in both the food samples. ii. Infer with suitable reason for the different flavors in the food samples.	CO2	*PO2, PO3*	**5**
			UNIT -II			
	3.	a)	Taking proteins as example, discuss the negative effects caused by food processing techniques. Mention the major organoleptic qualities disturbed in such conditions.	CO1	*PO1, PO2*	**10**
		b)	Following are the two food samples Food sample 1: A cheese enriched with water content (a_w of 0.92). Food sample 2: A mixed fruit jam enriched with water content (a_w of 0.90) i. What is a_w in the food samples and are the values appropriate to preserve the food. Justify suitably. ii. How a_w can be altered in food samples without changing the overall content of water?	CO2	*PO2,PO5*	**5**
		c)	A poultry meat enriched with added nitrate of around 150 mg/Kg. In addition to it the meat was processed with a nitrate reducing enzyme. Are the added nitrate and the enzyme right for the keeping quality of the food? Discuss accordingly.	CO3	*PO2,PO3*	**5**
			OR			
	4	a)	A meat from one source reported to have high amounts of linoleic and linolenic acid while meat from another source had high amounts of palmitic acid compared to oleic acid. Both the food items are supposed to be processed with water and without any vacuum conditions. Assume that the food processed at high temperature for half an hour. i. Will one get the meat of good organoleptic quality in such conditions? ii. How does the fatty acid distribution impact on the palatability of food in such conditions? Support your answer with reaction mechanisms. iii. Provide solution to overcome any undesirable qualities in such conditions.	CO3	*PO2,PO3*	**10**
		b)	What is PPO enzyme? What conditions and the food components the enzyme needs to bring undesirable changes in food?	CO2	*PO1,PO2*	**05**
		c)	It is not just the sugars alone but even the sugar derivatives have impact on the food quality. Justify the statement.	CO2	*PO1,PO2*	**05**

			UNIT -III			
	5	a)	The following two beverages are given. Beverage 1: A lemonade flavor with 50% of water, 25% of different salts and remaining are the flavors. The beverage with this composition is recommended for soccer player who does strenuous exercise to be consumed intermittently during the game. Beverage 2: A plain beer with 40% of water, 55% of alcohol and 5% sugar. The beverage with this composition is recommended for moderate alcohol consumers. i. Are the given compositions of beverages right as per the standards? Justify suitably. ii. Does the beverage lack any of the important components to be included? Discuss the same. iii. Highlight the importance of major components and their quantities.	CO3	*PO2,PO3*	**10**
		b)	Explain any two methods to analyse the water content in foods.	CO1	*PO1*	**5**
		c)	Discuss on the physical and chemical property of the egg components that contributes to the keeping quality of the food.	CO1	*PO1*	**5**
			OR			
	6	a)	A GM crop has revolutionized the field of agriculture by occupying the 50% of global biotech crops. Identify the GM crop; describe the properties and its successful adoption.	CO4	*PO1, PO2*	**10**
		b)	A complete protein extract of milk sample was suspended in water at a conc. Of 20% (w/v). Assume that the composition has only the proteins and purpose is to separate respective proteins. i. Provide an eco-friendly way of separating and precipitating an important protein of cheese by adding any food-grade external chemical compound. Explain the mechanism. ii. Comment on the left over portion of milk protein in aqueous part.	CO4	*PO1, PO2*	**5**
		c)	Assume that a food component has only reducing sugars in it. i. Give a general protocol to estimate the overall content of reducing sugar. ii. Highlight the important demerit of the estimation method with respect to composition and provide the solution for the same.	CO3	*PO2, PO5*	**5**
			UNIT-IV			
	7	a)	A vegetable gravy prepared consisting of ground nut oil rich in PUFAs and carbohydrates with added ascorbic acid. The food suspension was treated at around 175 ^{o}C for 45-60 min. Assume that the Millard reaction is going to take place during the treatment procedure. With the given conditions and specific ingredients, do you expect only the beneficial compounds to be formed in the food. Justify suitably.	CO3	*PO2, PO5*	**10**

		b)	Briefly write the importance of freezing in maintaining the quality of the foods. How freezing can also deteriorate the food? Comment.	CO3	*PO2, PO5*	**5**
		c)	Oven drying of the food has shortcomings when compared to vacuum drying. Justify.	CO3	*PO1, PO2*	**5**
			OR			
	8	a)	Discuss any three two classes of toxic compounds formed in the food during heating and cooking. Give the chemical nature, process of formation and their deleterious effects on the consumers.	CO4	*PO2, PO3*	**10**
		b)	What is PATP and why this high pressure processing technique is not able to get commercialized in various parts for routine food processing?	CO4	*PO2, PO3*	**5**
		c)	A food enriched with glycerol and acylglycerols was treated at high temperature of 150-200 ^{o}C for 30 min. Assume the water used in the processing had free chloride content. What kind of products do you expect in such conditions and are they desirable or undesirable? Justify suitably.	CO4	*PO2, PO3*	**5**
			UNIT-V			
	9	a)	With any three metabolites discuss the properties and importance of Bio-active components of plant-origin.	CO2	*PO1, PO2*	**10**
		b)	Write a brief note on nano foods.	CO4	*PO1*	**05**
		c)	Describe the essential features and importance of nano-food packaging materials.	CO4	*PO1,PO2*	**05**
			OR			
	10	a)	With any three metabolites discuss the properties and importance of Bio-active components of animal-origin.	CO4	*PO1,PO2*	**10**
		b)	Distinguish prebiotics from probiotics with suitable examples.	CO4	*PO1,PO2*	**05**
		c)	What are biosensors? Explain the basic design criteria of a biosensor.	CO4	*PO1,PO2*	**05**

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