


Name:			
Enrolment No:			
<b>UPES</b> <b>End Semester Examination, December 2024</b>			
<b>Course: Microbiology and Microbial Technology</b> <b>Program: B.Tech Biotechnology, BME and Food Technology</b> <b>Course Code: HSMB2040</b>		<b>Semester : III</b> <b>Duration : 3 Hours</b> <b>Max. Marks: 100</b>	
<b>Instructions: Read all questions carefully</b>			
<b>S. No.</b>	<b>Section A</b>	<b>Marks</b>	<b>COs</b>
	<b>Short answer questions/ MCQ/T&amp;F</b> <b>(20Qx1.5M= 30 Marks)</b>		
Q 1	Which of the following is not a cereal or vegetable or fruit-based fermented product? (A) Wine (B) Sauerkraut (C) Beer (D) Vinegar	1.5	CO1
Q 2	Anaerobic respiration by yeast produces (A) CO <sub>2</sub> (B) Wine and Beer (C) Alcohol (D) All of the above	1.5	CO1
Q 3	In dough, the starch is digested into sugar through. (A) Amylase (B) Protease (C) Maltase (D) Lactase	1.5	CO1
Q 4	Beer is produced by the fermentation of _____? (A) Barley (B) Grape (C) Rice (D) Oranges	1.5	CO1
Q 5	Which of the following is NOT a criterion to create a media? (A) It should be able to produce the maximum yield of product (B) It should be able to produce the maximum concentration of product (C) It should be easily sterilized (D) It should permit the maximum rate of product formation, no matter how costly it is	1.5	CO2
Q 6	Which of the following is NOT a criterion for the choice of an organism? (A) The organism must be genetically stable (B) The organism must be able to produce a high yield of product (C) The optimum temperature for the growth of an organism must be above 50°C (D) The organism must be able to grow in an easily available nutrient medium	1.5	CO2

Q 7	Which of the following method is useful for the isolation and detection of organisms having the ability to produce organic acids? (A) Crowded plate technique (B) Auxanographic technique (C) Enrichment culture technique (D) Indicator dye technique	1.5	CO2
Q 8	Which of the following is NOT a cryoprotective agent? (A) DMSO (B) Glycerol (C) Ethylene glycol (D) Paraffin wax	1.5	CO2
Q 9	Which of the following sensor is used to measure the acid/alkali addition? (A) pH (B) Redox (C) Temperature (D) Oxygen	1.5	CO3
Q 10	The agitator is required to _____? (A) Provide air (B) Mixing objectives (C) Purify the product (D) Sterilize the media	1.5	CO3
Q 11	A period during which the growth rate of cells gradually increases is known as _____? (A) Lag phase (B) Log phase (C) Stationary phase (D) Death phase	1.5	CO3
Q 12	The Fed-batch fermenter is a/an _____ culture system (A) Open (B) Closed (C) Isolated (D) Semi-closed	1.5	CO3
Q 13	The fermentation of milk to form cheese is done by _____ bacterium species? (A) <i>Saccharomyces spp.</i> (B) <i>Lactobacillus spp.</i> (C) <i>Aspergillus spp.</i> (D) <i>Penicillium spp.</i>	1.5	CO4
Q 14	Citric acid is used in the manufacture of jams and jellies (A) True (B) False	1.5	CO4
Q 15	Which of the following fungi produces alpha amylase? (A) <i>Bacillus subtilis</i> (B) <i>Penicillium</i> (C) <i>Bacillus diastaticus</i> (D) <i>Bacillus megaterium</i>	1.5	CO4
Q 16	Which physical method of microbial control uses moist heat under pressure? (A) Pasteurization (B) Autoclaving (C) Hot air sterilization (D) Incineration	1.5	CO4
Q 17	Which of the following is NOT a benefit of using sterilization in food microbiology? (A) Increased shelf life (B) Preservation of nutritional value (C) Elimination of harmful microorganisms (D) Increase in food texture and taste	1.5	CO5

Q 18	Which of the following is a key difference between aerobic and anaerobic respiration? (A) Aerobic respiration occurs in the cytoplasm; anaerobic respiration occurs in the mitochondria (B) Aerobic respiration requires oxygen; anaerobic respiration does not (C) Aerobic respiration produces less energy than anaerobic respiration (D) Aerobic respiration produces lactic acid as a byproduct	1.5	CO5
Q 19	What happens if the fermentation temperature is too high for the microbial culture? (A) The fermentation rate increases indefinitely (B) Microbial cells die or become inactive (C) The pH of the medium automatically adjusts (D) The product yield improves	1.5	CO5
Q 20	Which of the following is a disadvantage of batch fermentation compared to continuous fermentation? (A) High risk of contamination (B) Reduced product quality (C) Lower overall productivity over time (D) Greater need for sterile conditions	1.5	CO5
<b>Section B</b> <b>(4Qx5M=20 Marks)</b>			
Q 1	List any five components of the fermenter and their function.	5	CO1
Q 2	Describe the stages involved in the selection of industrially important microbes.	5	CO2
Q 3	Distinguish between oxygen uptake rate (OUR) and oxygen transfer rate (OTR) and explain the formula to measure OUR and OTR.	5	CO3
Q 4	Illustrate the design of a solid-state fermenter and list the solid substrates used.	5	CO3
<b>Section C</b> <b>(2Qx15M=30 Marks)</b>			
Q 1	You own a pharmaceutical industry and would like to produce penicillin antibiotic. A. How do you screen, select and improve the microbial strain for the production of penicillin in your industry? <b>(5 marks)</b>	15	CO2

	<p>B. Formulate a medium (carbon and nitrogen source) out of waste product to produce the antibiotic. <b>(5 marks)</b></p> <p>C. Which fermenter design you would employ to produce penicillin and explain why? <b>(5 marks)</b></p>		
Q 2	<p>A nutraceutical company would like to produce single cell protein (SCP) products.</p> <p>A. What organisms would you recommend for SCP and justify your suggestion? <b>(5 marks)</b></p> <p>B. Would you recommend aerobic or anerobic fermentation and explain why? <b>(5 marks)</b></p> <p>C. Which fermenter (Batch, Fed-batch or continuous) would you suggest for the SCP production and justify? <b>(5 marks)</b></p>	15	CO5
<p><b>Section D</b> <b>(2Qx10M=20 Marks)</b></p>			
Q 1	<p>Discuss strain improvement and its significance. Write any two different methods used for strain improvement with an illustration.</p>	10	CO2
Q 2	<p>Write the beer production process and the detailed fermentation steps with an illustration.</p>	10	CO4