Name: **Enrolment No:**	

UPES

End Semester Examination, December 2024

Course: Fermentation Technology — **Semester: 3rd**

Program: MSC-MICROBIOLOGY — **Duration: 3 Hours**

Course Code: HSMB8002 — **Max. Marks: 100**

Instructions: Attempt all questions

S. No.	Section A Short answer questions/ MCQ/T&F (20Qx1.5M= 30 Marks)	Marks	COs
Q 1	Which of the following is used as a nitrogen source in fermentation media? a) Glucose b) Ammonium sulfate c) Yeast extract d) Sodium chloride	**1.5**	**CO1**
Q 2	Which of the following is NOT a type of fermenter? a) Airlift fermenter b) Packed column c) Rotating disk fermenter d) Tower fermenter	**1.5**	**CO1**
Q 3	Which of the following is used in recombinant DNA technology for strain improvement? a) UV irradiation b) Enzyme restriction c) Gene cloning d) Gene knockout	**1.5**	**CO2**
Q 4	The purpose of aeration in a fermenter? a) To enhance heat transfer b) To provide oxygen for aerobic microorganisms c) To control pH d) To prevent foaming	**1.5**	**CO4**
Q 5	Which organism is commonly used for citric acid production? a) Saccharomyces cerevisiae b) Aspergillus niger c) Escherichia coli d) Bacillus subtilis	**1.5**	**CO5**
Q 6	The main function of anti-foaming agents in fermentation media is _____ a) To enhance microbial growth	**1.5**	**CO3**

	b) To reduce foam formation c) To increase oxygen transfer d) To maintain nutrient balance		
Q 7	Which of the following growth phases is associated with maximum microbial activity? a) Lag phase b) Exponential phase c) Stationary phase d) Death phase	**1.5**	**CO6**
Q 8	Which product is NOT typically produced through fermentation? a) Ethanol b) Penicillin c) Vitamin C d) Citric acid	**1.5**	**CO3**
Q 9	What type of culture system is typically used for continuous fermentation? a) Batch culture b) Fed-batch culture c) Continuous culture d) Static culture	**1.5**	**CO2**
Q 10	The role of buffers in fermentation media is_____ a) To increase nutrient content b) To regulate pH c) To promote aeration d) To enhance microbial growth	**1.5**	**CO2**
Q 11	Fermentation can be used to produce both primary and secondary metabolites. (True or False)	**1.5**	**CO2**
Q 12	Penicillin is produced during the lag phase of microbial growth. (True or False)	**1.5**	**CO1**
Q 13	In a fed-batch culture, nutrients are added in a controlled manner during the fermentation process. (True or False)	**1.5**	**CO3**
Q 14	Air is typically added to fermentation media to prevent contamination. (True or False)	**1.5**	**CO4**
Q 15	Microbial growth in continuous culture systems occurs at a constant rate. (True or False)	**1.5**	**CO6**
Q 16	Biotechnology, the practical application of microorganisms in making products for human use, is a relatively new science, which began in Pasteur's time. (True or False)	**1.5**	**CO1**
Q 17	State whether secondary metabolites are useful? (True or False)	**1.5**	**CO2**
Q 18	There is a high amount of nutrients in growth media. (True or False)	**1.5**	**CO1**
Q 19	Alcoholic fermentation is carried by yeast known as _____ a) Lactobacillus	**1.5**	**CO2**

	b) Bacillus c) Saccharomyces cerevisiae d) Escherichia coli		
Q 20	Arrange the following steps in the correct sequence to produce substances in industrial microbiology: a) fermentation, downstream processing, removal of waste, inoculation. b) inoculation, downstream processing, fermentation, removal of waste. c) inoculation, fermentation, downstream processing, removal of waste. d) removal of waste, inoculation, fermentation, downstream processing.	**1.5**	**CO2**
Section B (4Qx5M=20 Marks)			
Q 1	Illustrate five major domains of fermentation.	**5**	**CO2**
Q 2	Explain thoughts and definitions of fermentations according to field experts.	**5**	**CO1**
Q 3	Differentiate primary and secondary metabolites and level them in a microbial growth curve.	**5**	**CO1**
Q 4	Create generic diagrammatic representation of a fermentation process	**5**	**CO2**
Section C (2Qx15M=30 Marks)			
Q 1	Explain the principles of animal cell culture, including the types of culture media used and the nutritional requirements for optimal cell growth. ***(10 Marks)*** Discuss the applications of animal cell culture in biotechnology. ***(5 Marks)***	**15**	**CO3**
Q2	Design a comprehensive strategy for maintaining aseptic conditions in animal cell culture, highlighting its importance for successful outcomes. (5 Marks) Devise innovative techniques for aseptic inoculation, contamination prevention, and cell synchronization in culture systems, showcasing their potential effectiveness. (10 Marks)	**15**	**CO6**
Section D (2Qx10M=20 Marks)			
Q 1	Analyze the key applications of animal cell culture in biotechnology, identifying their significance. (5 Marks) Examine how these applications are utilized in the medical and pharmaceutical industries, highlighting their impact. (5 Marks)	**10**	**CO4**
Q2	Describe the importance of rDNA in strain improvement. Draw basic schematics of recombinant DNA technology.	**10**	**CO2**