

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -I EXAMINATION- 2026

B.Tech-V Semester (BT)

COURSE CODE (CREDITS): 25B11BT512 (04)

MAX. MARKS: 15

COURSE NAME: Bioprocess Engineering

COURSE INSTRUCTOR: Dr. Saurabh Bansal

MAX. TIME: 1 Hour

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of a calculator and a formula sheet (signed by me) is allowed.

Q. No.	Question	CO	Marks
Q1	List the major stages of a bioprocess from laboratory development to downstream processing.	1	2
Q2	Differentiate between growth-associated and non-growth-associated products.	1	2
Q3	Explain how K_s affects the length and character of the deceleration phase.	2	2
Q4	Biomass increases from 0.50 to 8.0 g/L in 8 h during exponential growth. Calculate μ .	2	1
Q5	A batch produces $X_{\max} = 18$ g/L from $X_0 = 1$ g/L. If the total cycle time is 12 h, calculate the average biomass productivity.	2	1
Q6	A chemostat has $V = 1000$ L and $F = 700$ L/h. Calculate D , residence time, and whether D would exceed a D_{crit} of 0.80 h^{-1} .	2	2
Q7	Two strains have identical $\mu_{\max}$ but different K_s values. Predict which strain will dominate as the limiting substrate becomes scarce and explain using Monod kinetics.	2	2
Q8	Sketch a chemostat with recycle. Derive the mass balance equation for biomass, clearly explaining the assumptions and significance of each term.	2	3