JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2026

Ph.D.-I Semester (BT)

COURSE CODE (CREDITS): 25P1WBT232 (03) MAX. MARKS: 15

COURSE NAME: Advances in Bioprocess Engineering

COURSE INSTRUCTOR: Dr. Saurabh Bansal MAX. TIME: 1 Hour

Note: *(a) All questions are compulsory. The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*

(b) Use of a calculator is allowed.

(c) Use of the formula sheet signed by me is allowed.

Q. No.	Question	Marks
Q1 a)	What is meant by washout in a chemostat?	1
Q1 b)	A chemostat has $\mu_{max} = 0.45\ h^{-1}$. What qualitative risk arises if D is increased above this value?	1
Q1 c)	If $D = 0.20\ h^{-1}$, calculate the ideal residence time.	1
Q2	A fed-batch begins at 2.0 L and receives feed at $0.10\ L\ h^{-1}$ for 8 h. Estimate the final liquid volume if evaporation and sampling are negligible.	1
Q3	For shear-sensitive CHO cells producing mAb, why should reactor selection not be based on oxygen transfer alone?	2
Q4	With the aid of a diagram, explain the design of an airlift bioreactor and the role of each part in process efficiency.	3
Q5	Critically evaluate why industrial bioprocesses predominantly employ batch culture rather than chemostats, despite the latter's higher productivity potential.	3
Q6	In a mixed culture, organism A grows poorly alone but strongly with organism B. Design experiments using spent medium, physical separation or metabolite supplementation to test cross-feeding.	2
Q7	Where should an impeller be located in a stirred tank reactor to maximize mixing efficiency? Draw a suitable diagram.	2