

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

**CLASS: BTECH
BRANCH: BIOTECHNOLOGY**

**SEMESTER : VII
SESSION : MO/2025**

SUBJECT: BE402 BIOREACTOR AND BIOPROCESS DESIGN

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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		CO	BL
Q.1(a)	What is the difference between mixing and agitation? Describe the working principle of flat blade impeller.	[5] 1	2
Q.1(b)	How mass transfer is happening as oxygen transport.	[5] 2	2
Q.2(a)	What are the factors affecting the power consumption of a bioreactor?	[5] 2	3
Q.2(b)	With a diagram, define how a safety valve works? What is power number?	[5] 3	3
Q.3(a)	What is the difference between lab scale and pilot scale? What are the factors affecting the power consumption during the reaction?	[5] 2	3
Q.3(b)	What are the process parameters need to be verified in scale up?	[5] 2	3
Q.4(a)	Describe the parts of biosensor (with diagram) and how sensors can be selected?	[5] 3	3
Q.4(b)	What is MEMS? How metal-based gas sensor can be worked for sensing?	[5] 3	4
Q.5(a)	How citric acid can be produced by surface method with flowchart.	[5] 3	3
Q.5(b)	With diagram discuss the recovery process of individual acetone and butanol.	[5] 3	4

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