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GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022
B. Tech Degree Examinations, December – 2020
(Seventh Semester)
BBTPC7010 – Bioreactor Design and Analysis
(Biotechnology)

Time: 2 hrs

Maximum: 50 Marks

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions)**(1 x 10 = 10 Marks)****Q.1. Answer ALL questions**

	[CO#]	[PO#]
a. In a fluidized bed reactor, the function of the disengagement zone is to (i) reduce loss of particles from the reactor (ii) reduce the velocity of the particles near the surface of the reactor (iii) reduce foaming problems (iv) all of the above	1	1
b. Which of the following bioreactor consists of a vessel replaced by a multi-layered bag? (i) Single Use bioreactors (ii) Perfusion bioreactors (iii) Airlift bioreactor (iv) Tower bioreactor	1	3
c. The bioreactor is not capable of (i) Produce electricity (ii) Producing aseptic conditions (iii) Controlling pH (iv) Meeting containment regulations	1	1
d. In which of the following bioreactors, the particles are not immersed in liquid? (i) Packed-bed (ii) Stirred vessel (iii) Air-lift reactor (iv) Trickle-bed	2	1
e. Which of the following is the function of draft tube? (i) Increase the velocity (ii) Minimize kinetic energy (iii) Decrease the pressure (iv) Maximize kinetic energy	2	2
f. A culture system with constant environmental conditions maintained through continual provision of nutrient and removal of wastes is called _____ culture system. (i) semi-continuous (ii) batch (iii) fed-batch (iv) continuous	2	1
g. What is the unit of influent flow rate? (i) m ³ /d (ii) m ² /d (iii) m/d (iv) m d	2	2
h. Fluidized bed bioreactors provide higher mass transfer rates than packed bed bioreactors because (i) immobilized particles are smaller in the fluidized bed bioreactors (ii) particles move with the fluid in a fluidized bed bioreactor (iii) mixing is higher in fluidized bed bioreactors (iv) all of the above	3	1
i. The small-scale bioreactors have volume of (i) 5-10 litres (ii) 1-20 litres	3	2

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|---|----------------------|---|---|
| (iii) 10-20 litres | (iv) 1-10 litres | | |
| j. Which of the following fermenters are characterized by height to diameter ratio? | | 4 | 2 |
| (i) Perfusion bioreactor | (ii) Hollow fibre | | |
| (iii) Airlift fermenter | (iv) Tower fermenter | | |

PART – B: (Short Answer Questions)

(2 x 5 = 10 Marks)

Q.2. Answer ALL questions

	[CO#]	[PO#]
a. Draw and label the parts of bubble column reactor.	1	1
b. Write the disadvantages of plug flow reactors.	1	3
c. Elucidate fed batch cultivation.	2	3
d. Distinguish between scale up and scale down.	3	1
e. Write the different types of impeller used in bioreactors?	4	3

PART – C: (Long Answer Questions)

(6 x 5 = 30 Marks)

Answer ANY FIVE questions

	Marks	[CO#]	[PO#]
3. Describe the design consideration to be taken in account during the bio processing of animal cell culture.	(6)	1	3
4. With a neat sketch, explain the different components and operational procedures followed in Continuous Stirred Tank Reactor.	(6)	1	3
5. Elucidate packed bed reactor with applications and write down the design equations.	(6)	2	2
6. Elucidate in detail about the recycle phenomenon in CSTR reactors.	(6)	2	4
7. Elaborate enzyme adsorption immobilization technique.	(6)	3	3
8. How will you design the fluidized bed reactor for immobilized enzyme reaction?	(6)	3	3
9. Discuss the mechanical fittings in a bioreactor in detail.	(6)	4	3
10. List in detail about the analysis of various online and offline bioreactor parameters.	(6)	4	5

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