

Code No: D0301**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****M.TECH II - SEMESTER EXAMINATIONS, APRIL/MAY 2012****BIOREACTOR ENGINEERING****(BIOTECHNOLOGY)****Time: 3hours****Max. Marks: 60****Answer any five questions****All questions carry equal marks****- - -**

1. Explain in detail gas dispersion in agitated vessels.
2. Write short notes on
 - a) Air lift bioreactor
 - b) Fluidised Bed bioreactor.
3. Describe the various factors affecting volumetric oxygen transfer coefficient.
4. Discuss the general mass-balance equation and write about the types of mass-balance giving examples.
5. Explain the measurement of K_La by dynamic and chemical method.
- 6.a) Give a brief account of interaction between cells & turbulent eddies.
 - b) A fermentation broth with viscosity 10^{-2} Pas and density 1000kg m^{-3} is agitated in a 2.7m^3 baffled tank using a Rushton turbine with diameter 0.5 m & stirrer speed 1s^{-1} . Estimate the mixing time.
7. Explain the direct regulatory control and cascade control mechanism in animal cell cultures. Add a note on use of sensors in the bioreactor.
8. Explain the strategies involved in online and offline monitoring of bioreactors.
