AL-Qadisiya University
College of Engineering
CHEMICAL ENGINEERING DEPT.
Final Exam 2015-2016 (2nd attempt)
Examiner : Dr. Amer D. Zmat

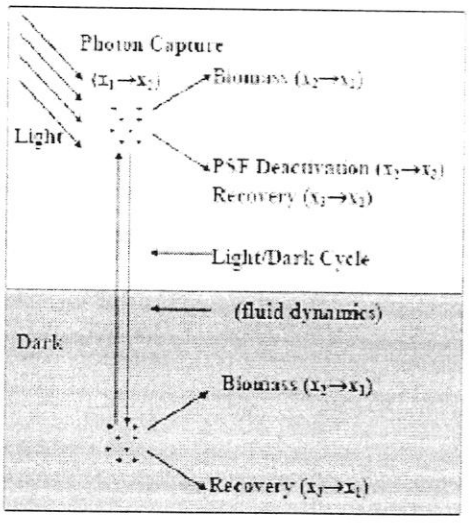
Subject: Biochemical Eng.
Class: 1st year
Time : 2 hours
Max. Marks: 100
Date: 10/ 09 / 2016

Answer Four questions

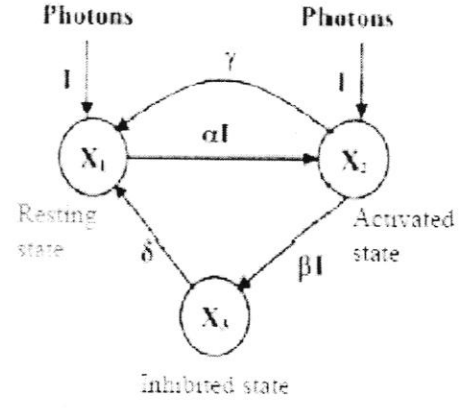
Q1. What is a bioreactor? What do we call a biochemical process when it is carried out in presence of air? What do we call a biochemical process when it is carried out in absence of air? State the main types of bioreactors. Explain with schematic diagrams.

Q2. Photosynthesis process that governs the photobioreactor performance can be represented diagrammatically as below:

Dynamic growth model representation: Photosythetic factory (PSF) approach



(a) Schematic representation of the interaction of photosynthetic kinetics and the fluid dynamics in the photobioreactor (from Wu and Merchuk, 2001)



(b) Structure of the three states model proposed by Eilers and Peeters (1988)

List the main equations that represent the three state model and state the two main conditions that the system works under them.

Q5. A continuous mixed reactor (CMR), as shown below, is used to aerobically oxidize suspended organic solids converting it into volatile suspended solids (VSS). If the flow rate is constant at 1000 m^3/d and the incoming biodegradable solids concentration is 500 gm/ m^3, **find the total amount of oxygen needed to oxidize 98% of the incoming COD**. Given that 200 gm/ m^3 of VSS is obtained. **What is the yield of the bioreactor**?