

## Assignment No. 2

### BT603 – Fermentation Technology

#### Solution:

##### Question No. 1

Differentiate between solid state and submerged fermentation. (5 points) (5)

**Answer:** Below are the key differences between Solid state and submerged fermentations.

- 1: One of the key difference between solid state and submerged fermentation is the cultivation of microorganisms. Like in solid state fermentations, microorganisms are grown on solid substrate with a very low moisture and submerged fermentation microorganisms are grown in a liquid medium that contains 95% of water content.
- 2: Another key difference between solid state and submerged fermentation is the distribution of nutrients concentration. The nutrients concentration is evenly distributed in submerged fermentation and it's not equally distributed in solid state fermentations.
- 3: When it comes to agitation, solid state may or may not required agitation and on the hand it's must for submerged fermentation.
- 4: Inoculum required for solid fermentation is high while very low ratio of inoculum is required for submerged fermentation.
- 5: The culture medium is free flowing in submerged fermentations while no free flowing in solid state fermentation.

##### Question No. 2

What is batch fermentation? Describe different phases of batch fermentation. (1+4)

**Answer:** Batch fermentation is a kind of fermentation process in which product is harvested after each successive run.

- 1: All the nutrients are added to the fermentor at the beginning of fermentation process.
- 2: The culture media is inoculated with the starter microorganisms.
- 3: The fermentation process is run for a fixed time period and during the process nothing is added except oxygen in the form air, an antiform agent and acid or base for pH control.
- 4: Product is harvest after successful running of the fermentor.
- 5: By-products goes to other downstream process.
- 6: Fermentor is cleaned out for another run.