

P P SAVANI UNIVERSITY

Fourth Semester of B. Tech. Examination

May 2019

SECH2091 Biochemical Engineering

28.05.2019, Tuesday

Time: 09:00 a.m. to 11:30 a.m.

Maximum Marks: 60

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION - I

Q - 1 Answer the following: (Any Five) [05]

- (i) Define: Enzymes.
- (ii) Discuss the effect of temperature on microbial growth.
- (iii) List the phases of cell growth.
- (iv) What do you mean cell inhibition?
- (v) State the classification of enzymes.
- (vi) A higher K_s value of Monod's equation means
(A) greater affinities to substrate (B) lower affinities to substrate (C) unaffected with the substrate bonding (D) lower dissociation constant value
- (vii) State Michaelis-Menten Equation.

Q - 2 (a) Explain the role of biochemical engineering in modern world. [05]

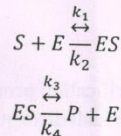
Q - 2 (b) Explain the growth of a typical microbial culture in batch conditions. [05]

OR

Q - 2 (a) State the factors affecting microbial cell growth. [05]

Q - 2 (b) List out various unit operations used in bioprocessing. [05]

Q - 3 (a) When glucose is converted into fructose by glucose isomerase, the slow product formation step is also reversible as: [05]



Derive the rate equation by employing the Michaelis-Menten approach.

Q - 3 (b) Write down Monod equation explaining each term in it. How do you determine the constant parameter of Monod equation? Is there any limitation of this equation? [05]

OR

Q - 3 (a) Explain mechanisms of enzyme action and concept of active site. [05]

Q - 3 (b) Define Growth Yield and other various Yield Coefficients used in cell culture. [05]

Q - 4 Attempt any one. [05]

(i) What is a degree of reduction of substrate and biomass?

(ii) Explain Lock and Key model with diagram for enzymatic reactions.

SECTION - II

- Q - 1 Answer the following: (Any Five) [05]**
- (i) Single cell protein (SCP) is the production of?
(A) extracellular proteins
(B) fermentation of waste products
(C) intracellular proteins extraction
(D) metabolites
- (ii) Secondary metabolites are produced during ____ phase
(A) Lag phase
(B) Log Phase
(C) Stationary Phase
(D) all the above
- (iii) Which of the following is an upstream process?
(A) Product recovery
(B) product purification
(C) media formulation
(D) Cell lysis
- (v) What do you mean by spent medium?
(A) Medium With High Nutritional Content
(B) Hydrated
(C) Dehydrated
(D) Non Toxic
- (vi) Fermentor should be filled with medium up to
(A) 65-70%
(B) 70-75%
(C) 75-80%
(D) 80-85%
- (vii) The heated medium passes through a holding section, which is usually maintained in
(A) isothermal conditions
(B) isotropic conditions
(C) adiabatic conditions
(D) isobaric conditions
- Q - 2 (a) List the different techniques used for purification process and explain any one in brief. [05]**
Q - 2 (b) Define cell disruption. Explain methods of cell disruption. [05]
- OR**
- Q - 2 (a) Explain briefly the principle of scale-up in bioprocess operation. [05]**
Q - 2 (b) Discuss in detail the types of reactors used in bioprocess. [05]
Q - 3 (a) State the functions of each part of a fermenter with the help of a schematic diagram. [05]
Q - 3 (b) Enlist the different types of spargers used for aeration in fermenter. [05]
- OR**
- Q - 3 (a) Discuss the working of Plug valve, Butterfly valve and Ball valves with diagram. [05]**
Q - 3 (b) Discuss various types of steam traps used in fermentation vessel. [05]
- Q - 4 Attempt any one. [05]**
- (i) Discuss the production of single cell protein with a diagram. State the use of single cell protein.
- (ii) Discuss the production of industrial alcohol with a diagram. State the use of single cell protein.
