B.Tech. Chemical 2007 Sem-VII.

33036

VOLTA – VII: WINTER – 2016 (2007 Course)

SUBJECT : ELECTIVE – I: BIOCHEMICAL ENGINEERING

Day : Friday
Date : 16-12-2016

Time : 2:30 P.M. TO 5:30 P.M.
Max. Marks : 80

N.B.:

1) **Q.No.1** and **Q.No.5** are **COMPULSORY**. Out of the remaining questions attempt **ANY TWO** questions from each section
2) Answers to both the sections should be written in **SEPARATE** answer books.
3) Figures to the right indicate **FULL** marks.
4) Assume suitable data if necessary.

SECTION – I

Q.1 a) State the difference between Eukaryotic cell and Prokaryotic cells. **[06]**
b) Discuss the role of lipids and fats in human life. **[04]**
c) Write a note on enzyme deactivation. **[04]**

Q.2 a) For batch cultivation in growth cycle phase, prove that $x = x_0\, e^{\mu\left(t-t_{lag}\right)}$ and $t_D = \frac{\ln 2}{\mu}$. **[06]**
b) Explain the MONOD Growth equation and discuss its parameters. **[07]**

Q.3 a) Explain the role of vitamins, minerals and growth harmones in the overall growth of a cell. **[07]**
b) With neat structure explain the role of DNA and RNA in human metabolism. **[06]**

Q.4 Write short notes on: **[13]**
a) Michaeli's – Menten kinetics
b) Temperature and pH dependency of enzyme activity
c) Line weaver – burk and Eadie Hofstee plot

SECTION – II

Q.5 Explain the following: **[14]**
a) Intraparticle diffusion and reaction
b) Mass transfer coefficient for single bubble
c) Bioprocess economics

Q.6 a) What is immobilized enzyme technology? **[06]**
b) Explain immobilized enzyme kinetics. **[07]**

Q.7 a) Derive an expression for Fed-batch bioreactor. **[06]**
b) What are different types of sterilization reactor? Why it is necessary? Deduce an expression for the time required to sterilize for viable number of micro-organism. **[07]**

Q.8 a) Discuss in detail the separation process via R.O. and Dialysis. **[06]**
b) Explain the sedimentation technique for the separation of biomolecules. Also derive expression for area required to separate the sediment for desirable under flow concentration. **[07]**

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33033

VOLTA-VII (2007 COURSE) : WINTER - 2016
SUBJECT: TRANSPORT PHENOMENA

Day: Tuesday
Date: 06-12-2016

Time: 2:30 P.M. TO 5:30
Max Marks: 80

N.B.

1) Question no 1 and Q.5 are **COMPULSORY.**
2) Solve any **TWO** questions from each section
3) Figures to the right indicate **FULL** marks.
4) Answer to both sections should be written in **SEPARATE** answer book.

SECTION-I

Q.1 Write a short note on **ANY TWO** of the following **(14)**

a) Newtonian and non-Newtonian fluids
b) Flow around sphere
c) Temperature and pressure dependency of thermal conductivity in gas and liquids

Q.2 a) How will you define velocity distribution for flow through annulus? **(07)**
b) Obtain an expression for mass transfer rate of flow '*w*' for an ideal gas in laminar flow in long circular tube. Flow is isothermal with negligible pressure change and constant viscosity. **(06)**

Q.3 a) How will you define velocity profile for flow around the sphere? **(07)**
b) Show that for Newtonian fluids with constant density, the normal stresses are zero at fluid-solid boundaries for any kind of flow pattern. **(06)**

Q.4 a) Derive overall heat transfer coefficient for heat conduction through composite wall. **(07)**
b) A thermocouple in a cylindrical well is inserted into gas stream. Estimate actual temperature of gas stream if, **(06)**
Temperature indicated by the thermocouple = 500 °F
Temperature of pipe wall = 350 °F
Heat transfer coefficient = 120 Btu/hr. ft^2.F
Thickness of well = 0.08 inch
Length of well = 0.2 ft

SECTION-II

Q.5 Write a short note on **ANY TWO** of the following **(14)**

a) Temperature and pressure dependency of mass diffusivity
b) Heat transfer coefficient
c) Transfer coefficient for high mass transfer rates

Q.6 Derive mathematical expression for mass transfer coefficient by free convection around a submerged object. **(13)**

Q.7 Derive and describe expression for diffusion with homogeneous chemical reaction. **(13)**

Q.8 a) Discuss the analogy between momentum, heat and mass transfer **(06)**
b) Define and derive expression for binary mass transfer coefficient in one phase. **(07)**

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