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1104E081

Candidate's Seat No :_____

M.Sc. (Sem.-IV) Examination

507

Bio-technology (Inte.)

April-2017

Time : 3 Hours] **[Max. Marks : 70**

Q-1 Answer the following (Any Two) 14

A. List physical controllers in a bioreactor and discuss device for temperature control.
B. Explain kinetics of microbial growth in a batch bioreactor and find the generation time if specific growth rate (*Mu*) is 0.2 h^{-1}
C. List process control equipment for a bioreactor and explain working of P, PI and PID controllers
D. Discus the design and applications of continuous bioreactors

Q-2 Answer the following (Any Two) 14

A. Describe the physical modes of heat transfers and types of heat exchanger fitted in a bioreactor
B. Explain principle of Thermal Mass Flow Controller (TMFC) and list its advantages.
C. Discuss theory of mass transfer of gases across the gas-bubble with formula
D. Elaborate factors affecting the rate of oxygen transfer rate in a bioreactor

Q-3 Answer the following (Any Two) 14

A. Define process optimization and explain the method for optimization of bioprocess
B. What is scale-up? Discuss objectives for scaling up of fermentation process
C. Describe methodology for fermentation scale-up and explain dynamic modelling
D. Discuss use of tool permutation combination in process optimization

Q-4 Answer the following (Any Two) 14

A. Explain Stoke's law for sedimentation and explain means for precipitation used in down-stream
B. Give theory of centrifugation and discuss design aspects of solid scroll bowl type of industrial centrifuge
C. Explain physical methods for cell-disruption with its pros and cons
D. Explain factors affecting rate of filtration and criteria employed to select suitable filtration method for a given separation

Q-5 Answer the following 14

1. How much saturated Ammonium Sulfate solution is added to set 100mL of broth to 25% saturation?
2. What is significance of isoelectric point of pH?
3. Define offset and oscillation.
4. Find Yx/s (yield) for biomass increase from 2 to 4 $g.L^{-1}$ with substrate used up from 10 to 4 $g.L^{-1}$
5. Name two products names made using solid substrate bioreactor
6. What is function of baffles in aeration process?
7. Explain: 'Kd is independent of Volume ratio'
8. Calculate total area involved in heat exchange for a double jacketed cylindrical reactor (20x50 cms) cooled at side walls
9. Calculate OTR when interfacial oxygen concentrations 0.5 and 1.5 $gms.lit^{-1}$ ($K_La = 0.2$)
10. List various reactor sizes used for scale up
11. Draw diagram for fitting of foam sensor and control in a bioreactor
12. Give advantages of using tangential flow filtration assembly
13. Name two Enzymes used to disrupt bacterial cell mass
14. Show outline of down-stream processing of Penicillin