BIOTECHNOLOGY & BIOINFORMATICS

(Bioprocess Engineering & Technology)

Course No: BIT C 402

Full Marks : 75

Time : 3 Hours

The figures in the margin indicate full marks for the questions

Answer Question No. 1 and any four from the rest.

1. Answer the following questions:

   a) How does insoluble proteins help in maintaining the structure of finished bakery product such as bread?   2

   b) How do plasmid contribute to MDR development?   2

   c) What are the effective agents in ripening of cheese?   2

   d) What are prebiotics, probiotics and synbiotics?   3

   e) "Microbial enhanced oil recovery is a tertiary oil recovery method" Justify   2

   f) How does foaming lead to unstable growing conditions in a bioreactor?   2

   g) What are the four main components of the feedback control?   2

2. Write on any five of the following: 3 x 5 = 15

   a) How does *Saccharomyces cerevisiae* deviate its metabolic process to produce glycerol from ethanol ?

   b) Why are semisynthetic form of antibiotics more commonly used ?

   c) Elucidate the basis for selection of sterilizing agents for food products?

   d) "Microbial growth is an example of autocatlytic reaction". Justify

   e) "Change in pH can be used to monitor microbial growth". Relate the statement to ammonium and nitrate usage as substrates in microbial growth media.

   f) Write on the downstream processing steps in the production of intracellular enzyme from fermentation broth.

3. How are microbes helpful in mineral beneficiation? Highlight different approaches used in these processes to recover minerals from low grade ores?   8+7=15

4. a) State how various low cost agricultural substrates are used for the ethanol production? Which one of these substrate is more preferred and why?   5+3=8

   b) Discuss the metabolic and fermentative conditions employed in enhancing the production of citric acid.   7

5. "Proper packaging of food is vital for its storage and economy". Justify the statement in light of various materials used for the purpose.   15

6. a) Briefly explain the conventional approach to food sterilisation with illustrations.   7.5

   b) Write the steps involved in industrial making of cheese? How will you ripen the cheese using microbes?   7.5

7. " Rate of microbial growth can be characterized by net specific growth rate". What is net specific growth rate considering cell death and endogenous metabolism during microbial growth? What are the different methods of determining cell mass concentrations for assessment of microbial growth in a bioreactor?   4+11=15

8 a) Write short notes on any two: 2.5 x 2 =5

   i. Shotgun and objective approach of isolation of industrial microorganisms

   ii. Photobioreactors as specialized bioreactors

   iii. Industrial production of glutamic acid

   b) Aqueous two-phase extraction is used to recover alpha-amylase from solution. A polyethylene glycol-dextran mixture is added and the solution separates into two phases. The partition coefficient is 4.2. Calculate the maximum possible enzyme recovery when:

   i. The volume ratio of upper to lower phases is 5.0   5

   ii. The volume ratio of upper to lower phases is 0.5.   5

****