

BEL103 General Microbiology
Minor Test - 2

Date: Oct.4, 2013

Time: 2:30- 3:30 pm

Venue: ILLT-1

Max. Marks - 15

Note : Attempt all questions. Both parts of a question should be answered at the same place.

- Q.1. (a) Name two major classes of macromolecules of in which phosphorus is present? (2)
- (b). Which of the two classes of microorganisms (chemolithotrophs or chemoorganotrophs) will be able to grow in a medium which contains the following compounds: KH_2PO_4 , NH_4Cl , MgSO_4 , CaCl_2 , trace elements and H_2 and CO_2 (from air)? Justify your answer. (2)

Q.2. (a). How do microorganisms growing at low temperatures such as -5C protect themselves from the deleterious effect of freezing of water? (2)

(b). While thermophilic microorganisms have been isolated from cold environments (5C), psychrophilic microorganisms have not from hot environments (90C). Why? (2)

Q.3. (a). *Escherichia coli* (Nitrogen content- 12%) is to be grown in a medium to a concentration of 40 g/L. If the nitrogen requirement of the cell is to be met by supplying potassium nitrate only, what should be its minimum concentration in the medium? (2)

(b). Consider the growth of *Escherichia coli* in a medium containing glucose as the sole source of carbon and energy. The batch culture is initiated with cell concentration of 0.1 g/L. If the doubling time of *E. coli* is 0.5 h, what will be the conc. of *E. coli* after 5 h assuming that it starts growing in log phase after an initial 1 h lag phase. (3)

If growth yield is 0.4, how much glucose was consumed by the growing culture of *E. coli* during log phase? (Assume that no glucose was consumed during the initial lag phase of 1 h). (2)

$$\frac{40 \text{ g}}{\text{L}} \times \frac{12}{100} = \frac{2.4 \text{ g}}{\text{L}}$$
$$\frac{2.4 \text{ g}}{\text{L}} \times \frac{5 \text{ h}}{0.5 \text{ h}} = \frac{24 \text{ g}}{\text{L}}$$