

6. Discuss the natural occurrence of plasmids in bacteria. Include in your answer such things as the size range of **naturally** occurring plasmids, and the types of beneficial properties that these plasmids can confer on their hosts.

7. Answer either part A or part B, but not both.
 - a. Describe in as much detail as possible the structure of the peptidoglycan bacterial cell wall.
 - b. Describe in as much detail as possible the difference between the cell wall/cell membrane systems of Gram negative and Gram positive bacteria.

8. Discuss positive and negative control of transcription in bacteria. You may use the *lac* operon of *E. coli* as an example if you wish.

9. Write a general stoichiometry for a typical microbial reaction and define the cell yield coefficient and the product yield coefficient. In the case of a product of secondary metabolism, such as Penicillin, as produced by a species of *Penicillium*, what would be your strategy for manipulating these two coefficients?

10. What are the three Domains of the Microbial Tree of Life? How do investigators add their species to the tree and how do they perform the analysis?