1. Subcellular localization of molecules is important for study of protein functions. Please provide two different approaches to examine the subcellular or ultrastructural localization of a novel molecule that you have just identified in your experiment.   Please describe the detection mechanism, advantage and limitation of your approach methodology. (10%)

2. Cancer tissues from patients are very precious resource to elucidate the underlying pathogenesis mechanisms.   However, tissue samples from the lesions often contained various amount of normal cells including those from the neighboring stroma (eg. fibroblasts or endotheliaum) and the infiltrating immune cells, which may further complicate the molecular genetic profilng analysis.   Therefore, differential isolation of molecules of interest from the cancer cells, not the normal cells becomes an important issue for a successful downstream analysis.   Please describe your approaches for the differential isolation or purification of molecules from cancer cells. (10%)

3. Molecular functional modules such as microtubules and kinesin have been shown to work in vitro to transport the attached polymer beads (see figure).   From your understanding of cell and molecular biology, please provide another example design for your desired lab-on-chip functions based on integrated bio-molecule assembly.   You may draw an illustration figure to describe your idea. (10%)

F M08 2-2
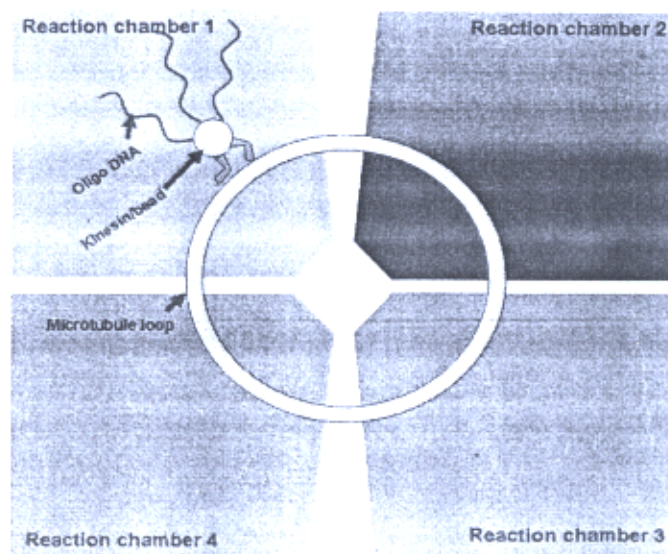
4. Please describe your strategy for "vaccine preparation" (12%)

5. Please describe known principles for (1) DNA amplification (2) RNA amplification. (14%)

6. What is "proteomics" ? Please describe the application of "proteomics" technology. (14%)

7. What is "human genome project" ? Please describe its goal, current progress, achievements, and impacts in modern biomedical research. (15%)

8. Describe the unique property of each of the following databases (15%)
    A) dbEST
    B) Genbank
    C) PDB
    D) SMART (Simple Modular Architecture Research Tool)
    E) dbSNP (single nucleotide polymorphism)