

1. Define the term "telomere". Explain why telomeres and telomerases are needed for replication of eukaryotic chromosome but not for replication of a circular bacterial chromosome? (15%)
2. List the names and functions of **four** types of cell-cell junction in epithelia in animal tissues. (15%)
3. When a plasma member receptor is activated by its agonist, there are several ways it can use to transmit the signal carried by the agonist to the downstream molecules. Eventually, the cell will react with proper responses. Describe **four** different signaling pathways used by a G-protein coupled receptor. (15%)
4. Describe **three** types of membrane lipid molecules. What do they have in common? What's the major difference between a membrane lipid molecule and a fat molecule? (15%)
5. In animals, proteins constitute about 50% of the mass of most plasma membrane. Name **four** kinds of membrane proteins, give an example for each kind of protein, and describe their specific functions. (15%)
6. The cell cycle can be halted in G_1 phase when the DNA is damaged. Several proteins (including P21, P53, cyclins, and CDKs) are involved in this process. Describe how these proteins work together to halt the cell cycle in G_1 . (15%)
7. Briefly explain the following cellular terminology: (10%)
 - (A) Chromatid
 - (B) Central dogma
 - (C) tumor-suppressor gene
 - (D) MPF
 - (E) pinocytosis