1. Three major groups of cytoskeletons are microtubules, microfilaments, and intermediate filaments and their properties are quite different. Could you describe them through their characteristic structure, diameter, protein monomers, motors, and functions in cell biology. (20%)
2. Compose a meaning lecture or a paragraph related microscopies by using following terms: 1. Magnification; 2, Resolution; 3, Contrast; 4, Staining dyes; 5, Image; 6, Light microscope; 7, Fluorescence Microscopy; 8, Electron microscope; 9. Lenses; Light sources . (10%)
3. Pathways for glycolysis and gluconeogenesis have nine intermediates and seven enzyme-catalyzed reaction in common. The three essentially irreversible reaction of the glycolytic pathway are circumvented in gluconeogenesis by four bypass reactions. The regulation of glycolysis and glyconeogenesis in animal cells involves allosteric regulation of key enzymes and hormonal regulation of PFK-2 and F2,6BP. Could you explain the regulations of two pathways in different organs or same cells at different time. (10%)
4. Both mitochondria and chloroplasts are bioenergetical and semiautonomous organelles. Point out the differences between photosynthesis and aerobic respiration through their sites of occurrence, energetics, types of ATP formation, electron transport chain or coenzymes involved, and alternation of pathways. (10%).

5. The gas nitric oxide is recognized as an important regulator within cells. Describe or diagram the production and functions of nitric oxide on blood vessels. (12%)

6. Membrane composes of phospholipid and protein. and its fluidity is vital for organism. Most organisms are able to regulate membrane fluidity. On cold and chilly days. how do animals and plants regulate their membrane fluidity? (10%)

7. Describe two major functions of smooth endoplasmic reticulum? (10%)

8. Describe the following terms (3%/each)

Amylopectin

Prion

Flippase

lectin

plasmodesmata

G-protein