

1. **Explain the following terms and their biological significance: (36%)**
 - a. Reverse Transcriptase
 - b. Monoclonal Antibodies
 - c. Gel Retardation
 - d. Branching Enzyme
 - e. Secondary Messenger
 - f. Phospholipase C
 - g. Wobble Hypothesis
 - h. SDS-PAGE
 - i. Lipid Peroxidation
2. **What are the precursor molecules for the carbon and nitrogen atoms in the purine and pyrimidine rings? (8%) .**
3. **Explain how to transfer acetyl CoA from mitochondria to cytosol in liver cell for the biosynthesis of fatty acid. (8%)**
4. **List the main components required in the activation, initiation, elongation and termination of protein biosynthesis. (8%)**
5. **Describe the different reaction pathways between glycolysis and gluconeogenesis. (8%)**
6. **Give the general structures for triacylglycerides and phospholipids. Explain why phospholipids but not triacylglycerides form micelle in aqueous solution. (8%)**
7. **Give the structures of the four bases in DNA and explain the base pairing of Watson-Crick model. (8%)**
8. **Calculate the yield of ATP when 1 mole of sucrose is completely metabolized via anaerobic glycolysis with hydrolytic cleavage into lactate. (8%)**
9. **In order to control blood cholesterol levels, would it be better to develop pharmacologic therapies that up-regulate or down-regulate low density lipoprotein (LDL) receptor levels in liver cells? (8%)**