1. **Complete the following:** (6 marks)
2. Glucagon increases the blood glucose level.
3. Ketone bodies are acetoacetate, acetone, and β-hydroxybutyrate.
4. There are two mechanisms for amino acids absorption; carrier proteins transport system and glutathione transport system.

**B- Calculate the total ATP produced from the oxidation of fatty acid which is 24 carbons long?** (2 marks)

24/2 = 12 acetyl CoA molecules x 12 ATP = 144 ATP

 11 FADH2 X 2 ATP = 22 ATP

 11 NADH X 3 ATP = 33 ATP

Total ATP produced = 144+22+33-2 = 197 ATP

**C- Define the following:** (4 marks)

1. **Glycogenolysis:** It is the breakdown of [glycogen](https://en.wikipedia.org/wiki/Glycogen) to glucose in the liver and glucose-6-phosphate in the muscle due to absence of glucose-6-phosphatase enzyme.
2. **Gluconeogenesis:**  It is the formation of glucose from non- carbohydrate source.

**D- write short notes on:** (6 marks)

1. **Sources of ammonia.**

1- Deamination of amino acids with the formation of α-keto acids and ammonia.

2- Glutamine in the kidney by glutaminase enzyme gives glutamic acid and ammonia which is used by the kidney to regulate the acid-base balance

3-Ammonia produced by the action of intestinal bacteria on the non-absorbed dietary amino acids.

4-Ammonia is released from monoamines (e.g. epinephrine, norepinephrine, and dopamine) by the action of monoamine oxidase (MAO) enzyme.

5- Ammonia is released during purine and pyrimidine catabolism

1. **Types of lipoproteins.**

1- Chylomicrons: are formed in intestine mucous.

2- VLDLs: very low density lipoproteins, created in liver.

3- LDLs: low density lipoproteins. Created in blood as cells remove triglycerides. These contain what the medical community refers to as “bad cholesterol”. LDLs travel to the peripheral circulation and contribute to atherosclerosis, the formation of fatty plaques in arteries.

4- HDLs: high density lipoproteins. Made in liver for return of cholesterol there. Contain “good cholesterol”. HDLs travel to the liver where their components are processed into useful body chemicals.