1) The reaction : Glutamate + NH3 + ATP → Glutamine is catalyzed the enzyme:
   a. Glutamic dehydrogenase
   b. Glutamine synthetase
   c. Glutaminase
   d. Glutamate semialdehyde dehydrogenase

2) Ketogenic amino acids are those which on degradation produce:
   a. Pyruvate
   b. Acetyle-CoA
   c. Oxaloacetate
   d. α-ketoglutarate

3) From the common substrate between Krebs and urea cycles are:
   a. Fumarate and malate
   b. Citrate and aspartate
   c. Fumarate and aspartate
   d. Citrulline and arginine

4) The intermediate donor of nitrogen incorporated to urea are:
   a. Carbomyl-phosphate and glutamic acid
   b. Carbomyl-phosphate and glutamine
   c. Carbomyl-phosphate and aspartic acid
   d. Carbomyl-phosphate and asparagines

5) All of the following are essential amino-acids EXCEPT:
   a. Valine
   b. Proline
   c. Cystein
   d. Glycine

6) The serine family of amino acids includes:
   a. Glycine and Proline
   b. Lysine and Histidine
   c. Leucine and Cysteine
   d. Cystein and Glycine

7) Which of the following amino acids contain sulfer?
   a. Cysteine and Lysine
   b. Cystein and Methionine
   c. Arginine and Methionine
   d. Cysteine and Isoleucine

8) The end product of purine catabolism in human is:
   a. Ammonia
   b. Ammonium ion
   c. Uric acid
   d. Urea

9) A molecule produced both in krebs cycle and urea cycle is:
   a. Arginine
   b. Aspartate
   c. Citrate
   d. Fumarate

10) Which of the following is the correct order of steps in cytosine catabolism?
   a. Cytosine → Uracil → Dihydrouracil → N-carbomylpropionate → beta-alanine
   b. Cytosine → Dihydrouracil → Uracil → N-carbomylpropionate → beta-alanine
   c. Cytosine → N-carbomylpropionate → Dihydrouracil → Uracil → beta-alanine
   d. Cytosine → Uracil → Dihydrouracil → beta-alanine → N-carbomylpropionate

11) In mammals the sulfur atom for the synthesis of cystein is derived from:

a. Inorganic sulfide
b. Sulfite
c. Methionine
d. Coenzyme A

12) Enzymes that incorporate free ammonia into forms useful for the central pathway of amino acid metabolism include:

a. Aspartate transaminase and alanine transaminase
b. Carbomyl phosphate synthase II and adenosine deaminase
c. Alpha-ketoglutarate aminotransferase and phosphoserine transaminase
d. Glutamine synthetase and glutamate dehydrogenase

13) The primary function of the urea cycle is:

a. To convert toxic ammonia to urea which can be excreted
b. The production of citric acid intermediate fumarate
c. The synthesis of ornithine
d. The synthesis of aspartate

14) Which of the following pathways are energy requiring processes?

a. Gluconeogenesis and urea cycle
b. Glycolysis and gluconeogenesis
c. Citric acid cycle and electron transport chain
d. Urea cycle and electron transport chain

15) Which of the following enzymes require NADPH in its reaction?

a. Glutamate dehydrogenase
b. Lactate dehydrogenase
c. Beta-hydroxybutyrate dehydrogenase
d. Glutamine synthetase

1	B
2	B
3	C
4	C
5	B
6	D
7	B
8	C
9	D
10	A
11	C
12	D
13	A
14	A
15	A
16	B