**ST MARY’S UNIVERSITY**

**TWICKENHAM, LONDON**

BSc Degree Examination students registered for

Level **FIVE**

Title**: Nutritional Biochemistry**

Code: **NUT5036**

Semester: **One**

Date: **10th January, 2020**

Time: **9:30 am – 11:30 am**

TIME ALLOWED: **TWO** HOURS

**SECTION A:**

Multiple choice; answer **ALL** questions (2 marks each)

1. The breakdown of food molecules to release energy is termed:
   1. Metabolism
   2. Anabolism
   3. Catabolism
   4. Transamination
2. During starvation, the Krebs cycle becomes less able to oxidise acetyl CoA. Why is this?
   1. Because rising glucose levels inhibit acetyl CoA.
   2. Oxaloacetate is diverted to gluconeogenesis.
   3. Elevated insulin promotes conversion of acetyl CoA into TAG.
   4. All of the above.
3. During β-oxidation the following sequence of reaction repeats:
   1. Oxidation, hydration, oxidation, cleavage.
   2. Reduction, dehydration, reduction, condensation.
   3. Condensation, oxidation, dehydration, oxidation.
   4. Cleavage, reduction, oxidation, reduction.
4. What are the two key enzymes involved in the conversion of non-carbohydrate precursors into triacylglycerol (de novo lipogenesis)?
   1. Fatty acid synthase and acetyl CoA carboxylase
   2. Fatty acid synthase and insulin
   3. Acetyl CoA carboxylase and malonyl CoA
   4. Lipoprotein lipase and fatty acid synthase
5. Glycolysis converts glucose into which molecule?
   1. Pyruvate
   2. Acetyl CoA
   3. Palmitate
   4. Triacylglycerol
6. In the electron transport chain:
   1. Coenzymes receive hydrogen atoms from NADH2 and FADH2.
   2. Oxidized molecules gain energy at the expense of reduced molecules.
   3. Oxidative phosphorylation takes place and ATP is formed.
   4. a and c only
7. Arachidonic acid, 20:4n-6 is:
   1. A polyunsaturated 18-carbon trans fatty acid with 6 double bonds
   2. A polyunsaturated 20-carbon fatty acid with 4 double bonds, the first occurring at carbon 6.
   3. A polyunsaturated 20-carbon fatty acid with 2 functional groups and 6 double bonds
   4. A monounsaturated fatty acid with 6 amine groups attached
8. During prolonged physical activity, which biochemical process creates glucose (to be utilised in the muscle) from non-glycogen sources?
   1. Glycolysis
   2. Gluconeogenesis
   3. Glycogenesis
   4. Lipogenesis
9. During protein synthesis, which process uses the codon A-U-G to begin?
   1. Transcription
   2. Transformation
   3. Translocation
   4. Translation
10. The pentose phosphate pathway is primarily responsible for the synthesis of:
    1. ATP
    2. ADP
    3. NADPH
    4. NADH
11. Glucose can be converted to fat but fat cannot be converted to glucose because:
    1. Three steps of glycolysis are irreversible
    2. AcetylCoA cannot be converted to lactate
    3. AcetylCoA cannot be converted to pyruvate
    4. Acetyl CoA cannot be converted to citrate
12. Reactions within \_\_\_\_\_ provide most of the energy needed by a typical cell.
    1. The cytoplasm
    2. The cell wall
    3. The mitochondria
    4. The endoplasmic reticulum
13. Transamination is the process by which:
    1. An amino group is attached to a Keto-acid
    2. An amino acid is broken down
    3. An amino group is attached to an enzyme
    4. An amino acid is converted into energy
14. Amino acids are formed from which of the following:
    1. Amine group, amine group, backbone
    2. Amine group, acid group, backbone
    3. Acid group, acid group, backbone
    4. Amine group and backbone only
15. A polyunsaturated fatty acid in trans formation has:
    1. Adjacent hydrogen atoms on the same side as the double bond
    2. Adjacent hydrogen atoms on the opposite side of the double bond
    3. All hydrogen atoms on the same side as the double bond
    4. All hydrogen atoms on the opposite side as the double bond
16. Linoleic acid and linolenic acid are examples of:
    1. Transport proteins.
    2. Lipoproteins.
    3. Essential fatty acids.
    4. Essential amino acids.
17. During lipolysis:
    1. Triglycerides are converted into molecules of acetyl-CoA.
    2. Triglycerides are broken down into glycerol and fatty acids.
    3. Lipids are converted into glucose molecules.
    4. Lipids are formed from excess carbohydrates.
18. The three stages of glycolysis in order, are:
    1. Priming, splitting, phosphorylation
    2. Respiration, priming, splitting
    3. Splitting, priming, respiration
    4. Phosphorylation, reduction, oxidation
19. A nucleotide is comprised of:
    1. Repeating sugar phosphate molecules.
    2. A phosphate, a sugar and a nitrogenous base.
    3. DNA.
    4. A purine and a pyrimidine.
20. According to Chargaff’s rule, cytosine must be paired with:
    1. Adenine
    2. Uracil
    3. Thymine
    4. Guanine

**SECTION B:** Answer **ALL** questions from this section (10 marks each)

1. Describe how the electron transport chain functions.
2. Describe the process of translation during protein synthesis.
3. Provide brief notes on the process of fatty acid synthesis, including the cellular conditions that promote fatty acid synthesis.
4. Describe how fat is digested and absorbed.
5. Describe the differences between the metabolic pathways of glycolysis and gluconeogenesis.

**END OF EXAMINATION**