RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree in Health Promotion
First Year – Semester I Examination – June/July 2018

BIO 1201 – CELL BIOLOGY & BIOCHEMISTRY

Index Number: **Time: Two (02) hours**

This question paper consists of sections A, B and C. Answer ALL questions in section A and B and ONE (01) question from section C.

For official use Only					
Marks					
Question 1	Question 2	Question 3	Question 4	Question 5	Total

Section A: Multiple choice questions (40 minutes)

1. Underline the **most suitable** option using a pen.

a) The tertiary structure of proteins is maintained by
   i) peptide bonds
   ii) hydrogen bonds
   iii) di-sulphide bonds
   iv) all of the above

b) Which of the following might be considered a part of the endomembrane system?
   A. Rough endoplasmic reticulum
   B. Transitional endoplasmic reticulum
   C. Smooth endoplasmic reticulum
   D. Outer mitochondrial membrane
   i) A only
   ii) A & C
   iii) A, B & C
   iv) All of the above

c) Lactose is a disaccharide that consists of
   i) glucose and fructose
   ii) glucose and galactose
   iii) fructose and galactose
   iv) two glucose molecules

d) Which one of the following is a component of bacterial cells?
   i) Ribosomes
   ii) Centrosomes
   iii) Chloroplasts
   iv) Lysosomes

e) Which of the following correctly describes chromatin?
   i) Complex of DNA and protein from which chromosomes are composed.
   ii) Total genetic content of a cell.
   iii) Proteins that give structural support to a chromosome.
   iv) Unpacked DNA in the form in which DNA exists when it is not tightly packed into chromosomes.

f) Secretory cells that release relatively large quantities of glycoproteins contain relatively large amounts of
   i) rough endoplasmic reticulum
   ii) smooth endoplasmic reticulum
   iii) golgi apparatus
   iv) mitochondria

g) Cellulose is made up of repeating units of
   i) β glucose subunits with 1-2 linkage
   ii) α glucose subunits with 1-4 linkage
   iii) β glucose subunits with 1-4 linkage
   iv) α glucose subunits with 1-2 linkage

h) DNA strand is directly involved in the formation of **all except**
   i) Protein
   ii) mRNA strand
   iii) tRNA molecule
   iv) another DNA strand

i) Which of the following statements is/are correct?
   i) Hooke was the first to observe living cells.
   ii) Schleiden and Schwann, both working independently, were first to propose the cell theory.
   iii) Leeuwenhoek was the first to observe live cells in pond water.
   iv) ~~b and c~~ (ii) and (iii)

Index No:

j) Structural polysaccharides include
   i) cellulose, glycogen
   ii) cellulose, starch
   iii) cellulose, chitin
   iv) chitin, glycogen

k) Which of the following statement is true about DNA?
   i) The two DNA strands are parallel and complementary
   ii) The two DNA strands are anti-parallel and non-complementary
   iii) The two DNA strands are antiparallel and complementary
   iv) None of the above

l) Nonpolar amino acids have R groups that contain
   i) O or only H
   ii) acidic or basic grouos
   iii) $-CH_3$ or other R groups
   iv) an aromatic ring

m) Which of the following macromolecules would yield only one type of monomer after complete hydrolysis?
   i) DNA
   ii) glycogen
   iii) protein
   iv) triglyceride

n) Which of the following statements are **not true** about endocytosis?
   i) It is the importation of large materials in to cells by engulfing them with their plasma membranes
   ii) Pinocytosis is a form of endocytosis in which the engulfed material is solid
   iii) Phagocytosis is a form of endocytosis in which the engulfed material is organic matter
   iv) It is a form of active transport

o) Enzyme inhibitors are substances that
   a) bind to enzymes and increase the activity
   b) bind to enzymes and decrease the activity
   c) decrease the activity without any physical connection to the enzyme
   d) None of the above

p) Which of the following applies to the cytoskeleton?
   i) It occupies the space within the nucleus as well as the cytoplasm.
   ii) It is typically composed of protein filaments actin, myosin and tubulin.
   iii) It consists as a network of fibrous proteins.
   iv) None of the above.

Index No:

q) In intracellular signal reception
   i) the signal molecules pass through the protein channels of the cell membrane.
   ii) the signals are small lipid-soluble or non-charged, nonpolar molecules.
   iii) the signals are small water soluble or charged, polar molecules.
   iv) the signal receptors are located on the cell membrane.

r) Which of the following is true about the cell surface receptors and signal molecules in cellular communication?
   i) Each cell has receptors of specific 3D shape that correspond to the shape of a specific signal molecule.
   ii) Each cell has receptors that change the 3D shape according to the shape of the signal molecule.
   iii) Each signal molecule can change the 3D shape.
   iv) All of the above are true.

s) The reason why the trans-fatty acids are solid at room temperature while cis-fatty acids are liquid at room temperature
   i) cis-fatty acid molecules are linear molecules that cannot make intermolecular bonds.
   ii) cis-fatty acid molecules are bent molecules that cannot make intermolecular bonds.
   iii) trans-fatty acid molecules are bent molecules that allow intermolecular bonds.
   iv) trans-fatty acid molecules are linear and can pack forming a dense structure.

t) Which reaction in DNA replication is catalysed by DNA ligase?
   i) Addition of new nucleotides to the lagging strand
   ii) Addition of new nucleotides to the leading strand
   iii) Base pairing of the template and the newly formed DNA strand
   iv) Attachment of Okazaki fragments to the lagging strand

(80 Marks)

Index No:

Section B: Structured Essay Questions (40 minutes)
Answer all sections only in the space provided.

2.

a) Define the two terms transcription and translation.

Transcription:.....

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Translation:.....

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(16 Marks)

b) What are the four steps of transcription?

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(8 Marks)

c) Briefly state the events that take place in the first three steps of transcription.

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(12 Marks)

d) Write the mRNA transcript of the following DNA strand.

GTCCATCCCATTTA

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(4 Marks)

e) What is the function of RNA polymerase in transcription?

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(10 Marks)

f) Explain the purpose of post-transcriptional modification.

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(10 Marks)

(Total: 60 Marks)

3.

a) Define what the cell cycle is.

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(8 Marks)

b) State the three main phases of the cell cycle and briefly describe the major events taking place in each phase.

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(24 Marks)

c) Name the three checkpoints in the cell cycle?

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(6 Marks)

Index No:

d) What type of enzyme regulates the checkpoints in the cell cycle?

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(2 Marks)

e) Briefly describe what is being checked in the second and the third checkpoints in the cell cycle?

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(12 Marks)

f) Explain why the second checkpoint is highly important to ensure a healthy life in multicellular animals.

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(8 Marks)

(Total: 60 Marks)

Section C: Essay questions (30 minutes)

4. a) Describe the differences between the attachments of spindles to centromeres in metaphase I of meiosis to that of which occur in the metaphase of mitosis.
   b) What effect does this difference have on the movement of chromosomes and final chromosome number in the resulting daughter cells?
   c) Describe how genetic diversity is generated in meiosis.

(100 Marks)

5. The endosymbiotic theory suggests that mitochondria and chloroplasts evolved from of prokaryotic cells that were engulfed by other prokaryotic cells. Support this statement by comparing the structure of prokaryotic cells with mitochondria and chloroplasts.

(100 Marks)

**********END**********