



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2022/2023**

- COURSE NAME : GENERAL BIOLOGY
- COURSE CODE : BWD 11703
- PROGRAMME CODE : BWD
- EXAMINATION DATE : FEBRUARY 2023
- DURATION : 3 HOURS
- INSTRUCTION : 1. ANSWER **ALL** QUESTIONS.
2. THIS FINAL EXAMINATION IS CONDUCTED VIA
 Open book
 / Closed book
3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF NINE (9) PAGES

TERBUKA

CONFIDENTIAL

PART A

This part contains **THIRTY (30)** questions. Read the questions carefully before answering. Mark your answers on the provided OMR form.

Q1

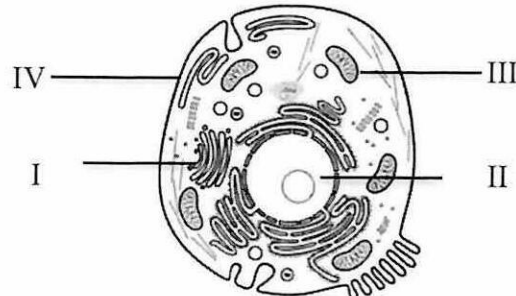


Figure Q1

Based on **Figure Q1** identify the site where most of the energy is released during cellular respiration.

- A. I
 - B. II
 - C. III
 - D. IV
- Q2** Identify the phase in which nuclear envelope disappears in the process of cell division.
- A. Prometaphase
 - B. Anaphase
 - C. G2 phase
 - D. S phase
- Q3** State the number of chromosomes of a fish species that has 20 diploid chromosomes in its bones.
- A. 10
 - B. 20
 - C. 30
 - D. 40
- Q4** Which of the following carbohydrate compounds does not have at least one glycosidic linkage?
- A. Mannose
 - B. Amylose
 - C. Sucrose
 - D. Lactose
- Q5** How does the straight chain of glucose differs from the straight chain of fructose?
- A. Type of carbonyl functional group
 - B. Number of functional groups
 - C. Number of carbon atoms
 - D. Point of unsaturation

TERBUKA

- Q6** Which of the following factors would lead to an increase in membrane fluidity?
- A greater proportion of unsaturated phospholipid
 - A relatively high protein content in the membrane
 - A greater proportion of saturated phospholipid
 - A reduction in temperature
- Q7** Which of the molecule diffuses through a cell membrane rapidly?
- Urea
 - Glucose
 - Benzene
 - Ethylene
- Q8** Which of the following is most accurate about the factors that affect the rate of osmosis across the cell membrane?
- Intracellular solute concentration
 - Extracellular solute concentration
 - Polarity of solutes
 - Molecular weight of solutes
- I and II
 - I and III
 - I, II and III
 - I, II and IV
- Q9** Which of the following is least likely to result in protein denaturation?
- Disruption of weak interactions by boiling
 - Altering net charge by changing pH
 - Changing the salt concentration
 - Exposure to detergents
- Q10** State the substance that causes a color change on the starch in the Biuret test?
- Magnesium
 - Potassium
 - Natrium
 - Copper
- Q11** What is the substance present in the starch complex that reacts to iodine solution?
- Amylopectin
 - Amylose
 - Cellulose
 - Glucose
- Q12** What is the role of an enzyme in an enzyme-catalyzed reactions?
- Bind a transition state intermediate, such that it cannot be converted back to substrate
 - Ensure that all of the substrate is converted to product
 - Ensure that the product is more stable than the substrate.
 - Increase the rate at which substrate is converted into product

Q13 Choose the **CORRECT** pair of bases found in nucleic acids.

	Pyrimidines	Purines
A.	adenine and thymine	cytosine and guanine
B.	adenine and cytosine	thymine and guanine
C.	uracil and thymine	adenine and guanine
D.	cytosine and uracil	thymine and cytosine

Q14 Which of the following is the dideoxynucleotide chain termination method?

- A. Sanger's method
- B. Edman's method
- C. Maxam-Gilbert method
- D. Automated sequencing method

Q15 Based on chemical structure, how are ddNTPs different from dNTPs?

- A. H in place of OH in 3 positions of dNTP
- B. OH in place of H in 3 positions of dNTP
- C. OH in place of H in 2 positions of dNTP
- D. CH₃ in place of OH in 3 positions of dNTP

Q16 What happens to daughter cells at the end of mitosis and cytokinesis when they are in the G₁ phase of the cell cycle?

- A. The cells will have half the amount of cytoplasm and half the amount of DNA.
- B. The cells will have half the number of chromosomes and half the amount of DNA.
- C. The cells will have the same number of chromosomes and half the amount of DNA.
- D. The cells will have the same number of chromosomes and the same amount of DNA.

Q17 State the effect on cells that only undergo the process of mitosis and not cytokinesis.

- A. A cell with two nuclei
- B. A cell with a single large nucleus
- C. Cells with abnormally small nuclei
- D. Feedback responses that prevent mitosis

Q18 State the components that make up chromatin.

- A. DNA
- B. DNA and proteins
- C. RNA and proteins
- D. DNA, RNA and proteins

Q19 How many FADH₂ and NADH are produced after 6 cycles of β-oxidation?

- A. 6,12
- B. 6,6
- C. 3,6
- D. 3,3

TERBUKA

- Q20** Which products of glucose oxidation are essential for oxidative phosphorylation?
- A. Pyruvate
 - B. Acetyl CoA
 - C. NAD^+ and FAD^+
 - D. NADH and FADH_2
- Q21** Explain why the Calvin cycle as a light independent reaction only takes place during the day.
- A. Sunlight is essential for RuBP regeneration
 - B. Sunlight is essential in activating carbon fixation
 - C. ATP and NADPH are only available in the presence of sunlight
 - D. The enzymes involved are unable to bind substrate in the dark
- Q22** Which of the following is best to describe DNA replication?
- A. Conservative
 - B. Conservative and discontinuous
 - C. Semi-conservative and discontinuous
 - D. Semi-conservative and semi-discontinuous
- Q23** What is the outcome of a cross between two heterozygous (Aa)?
- A. In the ratio 1:1 homozygous to heterozygous
 - B. In the ratio 1:2 homozygous to heterozygous
 - C. In the ratio 1 :3 heterozygous to homozygous
 - D. In the ratio 1 :4 heterozygous to homozygous
- Q24** Determine the point at which the genetic material is lost from the telomeres during DNA replication
- A. Enzymatic action of telomerase
 - B. "Unzipping" by DNA helicase
 - C. Joining of adjacent Okazaki fragments
 - D. Attachment of DNA polymerase to the leading strand
- Q25** Pyrimidine dimers resulting from UV light damage to DNA are removed from sequences via the action of
- A. DNA polymerase
 - B. Endonuclease
 - C. Primase
 - D. Ligase
- Q26** Which combination requires the most energy to separate?
- A. A:U
 - B. A:T
 - C. G:C
 - D. G:T

TERBUKA

- Q27** Which of the following explains that the hydrolysis of ATP is a spontaneous chemical reaction.
- That the reaction requires an input of energy to proceed
 - That the reaction does not require an input of energy to proceed
 - That the products of the reaction have lower free energy than the reactants
 - That the products of the reaction have higher free energy than the reactants
- Q28** Which of the parts of eukaryotic cells are difficult to be observed under the light microscope
- Nucleus
 - Lysosome
 - Vacuoles
 - Mitochondria
- I and II
 - I, and III
 - II and III
 - II, and IV
- Q29** Determine the phase in which haploid cells begin to appear during meiosis
- Anaphase I
 - Anaphase II
 - Telophase I
 - Telophase II

Q30

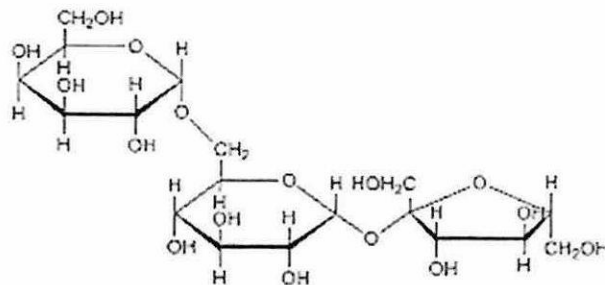


Figure Q30

- Choose the **CORRECT** molecules that represent the oligosaccharide shown in **Figure Q30**.
- Glucose, galactose and fructose
 - Mannose, mannose, fructose
 - Galactose, galactose, sucrose
 - Glucose, glucose, sucrose

TERBUKA

PART B

This part contains **THIRTY (30)** questions. State **TRUE** or **FALSE** based on the given statement. Write your answers in the provided answer booklet.

- Q1** Stearic acid is more reactive than linoleic acid.
- Q2** Fatty acid micelles in water are organized so that the carboxylic acid group faces the solvent and the hydrocarbon chain is directed inward.
- Q3** Beta pleated sheet structure belongs to the secondary level of protein's structure.
- Q4** Peptide bond has a rigid structure with partial double bond character.
- Q35** Hemoglobin is an example of a protein with a tertiary structure.
- Q3** Isoleucine is an alpha helix terminator.
- Q7** Quarternary structure of a protein refers to the organisation and spatial arrangements of proteins with many polypeptide chains.
- Q8** In an alpha helix, the R groups on the amino acid residues alternate between the outside and inside of the helix.
- Q9** Hydrogen bond links a growing fatty acid chain during lipogenesis.
- Q10** During DNA replication, the covalent bond between bases is cleaved.
- Q11** Mutation involves changes in the nucleotide sequence of a gene's DNA.
- Q12** During the replication of DNA, the synthesis of DNA on the lagging strand takes place in okazaki fragments.
- Q13** The enzyme primase joins the the fragments of DNA.
- Q14**

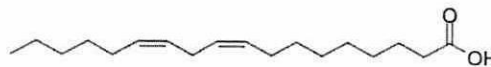


Figure Q14

The fatty acid structure shown in **Figure Q14** will undergo nine cycles of beta oxidation .

- Q15** In cellular metabolism, glycolysis is considered to be anabolic while gluconeogenesis is catabolic.
- Q16** On starvation, the body favours gluconeogenesis over glycolysis for blood glucose regulation.
- Q17** Twelve oxygen molecules are required to complete the reactions of aerobic respiration that begins with three molecules of glucose.

- Q18** High levels of hydrogen ions in the intermembrane space of mitochondria increases ATP production.
- Q19** The light-dependent reactions take place in the stroma, while the Calvin cycle takes place in the thylakoid membrane.
- Q20** Sugarcane and wheat plants have stomata that only opens at night.
- Q21** In bioenergetics, the presence of a catalyst lowers the activation energy of a chemical reaction but does not reduce the change in Gibbs free energy (ΔG).
- Q22** A high cellular concentration of NADH inhibits the entry of pyruvate into the Citric acid cycle.
- Q23** Most fatty acids enter the outer membrane of the mitochondria through transferase facilitated entry of free fatty acids.
- Q24** During cellular respiration, NADH is produced in the cytosol and the mitochondrial matrix.
- Q25** The synthesis of ATP catalyzed by ATP synthase is driven by the movement of electrons.
- Q26** The leading strand of the DNA molecule has the following sequence:

5'-CGCATGTAGCGA-3'

3'-GCGTACATCGCT-5' is the complementary sequence to the leading strand above.

- Q27** A polypeptide with a net positive charge at physiologic pH (~7.4) most likely contains amino acids with aliphatic R groups.
- Q28** Primary protein is the least likely to be affected by changes in pH.
- Q29** DNA polymerase catalyzes the synthesis of DNA in the 5'→3' direction, while reverse transcriptase catalyzes the synthesis of DNA in the 3'→5' direction.
- Q30** NADH, NADPH and FADH are high energy intermediates produced in the citric acid cycle.

TERBUKA

PART C

This part contains **TWO (2)** questions. Answer **ALL** questions in the answer booklet.

- Q1** Proteins are among the most abundant organic molecules in living systems with various structure and function. A single cell can contain thousands of proteins, each one with a unique function.
- (a) Describe **THREE (3)** characteristics of monomer that make up a protein structure.
(6 marks)
- (b) Draw the general structure of the protein's monomer as describe in **Q1(a)**
(2 marks)
- (c) Explain the **FOUR (4)** levels of protein structure by using suitable examples.
(12 marks)
- Q2** Heterotrophic and photosynthetic cells transform free energy into Adenosine Triphosphate (ATP) and other energy rich compounds, capable of providing energy for biological work at a constant temperature.
- (a) State a common source of free energy for heterotrophic and photosynthetic cells respectively.
(2 marks)
- (b) Describe **THREE (3)** roles of ATP as a high energy compound and renewable resource in living cells.
(6 marks)
- (c) Human muscles are fueled by cellular metabolism for continuous energy supply during exercise. Discuss ATP generation for the individual at rest and during exercise.
(12 marks)

-END OF QUESTION-

TERBUKA