KOLEJ TINGKATAN ENAM MELAKA
SEMESTER 1
2020

BIOLOGY TRIAL (964/1) **Duration: 1 ½ Hour**

NAME :	Class: Al Khawarizmi

*Instruction: This paper consists of three sections. Answer **ALL** questions in Section A and Section B. In Section C, answer only **TWO** questions out of three.*

Section A: Multiple Choices Question. Please indicate your answer in the table below.

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

1. Diagram 1 shows some interactions between amino acid R-groups in a polypeptide chain.

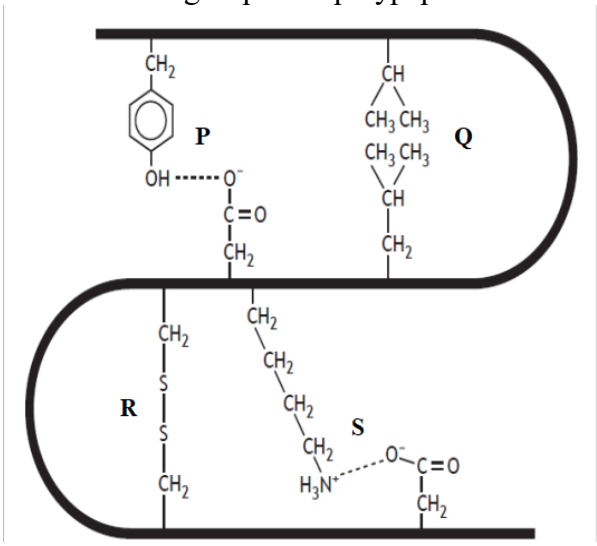


Diagram1

Which of the following statements are correct?

I. P and S show hydrogen bond
II. Q shows hydrophobic interaction
III. R has strongest disulphide bridge

A) I, II and III
B) I and III
C) II and III
D) III only

2. Which glycosidic bonds will be broken when a molecule of amylose is hydrolysed?

P: α1,4 Q: β1,4
R: α1,6 S: β1,6

A) P and R only
B) Q and S only
C) P only
D) Q only

3. Diagram 2 shows different structures and roles of membrane found in various organelles within the cell.

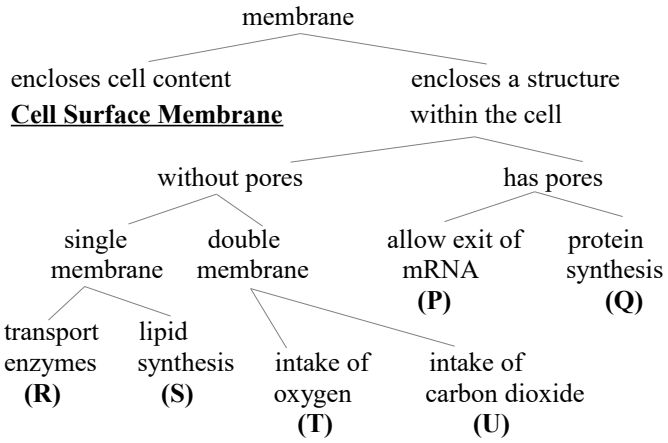


Diagram 2

Which of the following **CORRECTLY** identifies the organelles that possesses the membrane and function concerned?

	Chloroplast	Vesicle	Smooth ER	Rough ER	Nucleus	Mitocondria
A)	R	T	P	Q	S	U
B)	U	R	S	Q	P	T
C)	T	P	R	S	Q	U
D)	P	R	S	T	U	Q

4. What is the number of ATP molecules produced for each molecule of glucose in oxidative phosphorylation.

A) 38
B) 36
C) 34
D) 32

5. A fragment of DNA was found to have 70 cytosine bases and 90 adenine bases. What is the total number of sugar molecules in this fragment?
A) 80 C) 160
B) 320 D) 400

6. In Lactate fermentation, which of the following acts as oxidising agent?
A) Pyruvate C) NADH
B) NAD+ D) Lactate

7. The following are the functions of the plasma membrane EXCEPT
I. Support and protect the cell
II. Break down substances that pass through
III. As a barrier separate cytoplasm from extracellular environment
IV. Regulate the flow of substances in or out of the cell.
A) I and III C) I, III and IV
B) II only D) I only

8. What happens during the light reaction of photosynthesis?
A) ATP is hydrolysed and NADP reduced
B) ADP is hydrolysed and NADPH oxidised
C) ATP is phosphorylated and NADP reduced
D) ADP is phosphorylated and NADP reduced

9. Which of the following is the role of RuBP in photosynthesis?
A) Acts as an enzyme
B) Acts as an intermediate in sucrose formation
C) Acts as an hydrogen acceptor
D) Acts as an carbon dioxide acceptor

10. Diagram 3 shows stages in the Dark reaction of photosynthesis.

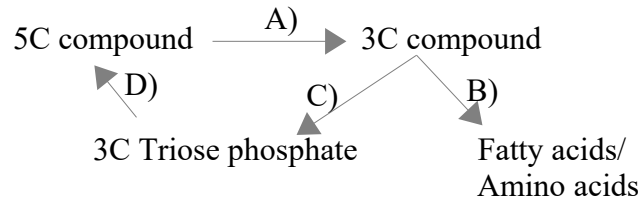


Diagram 3

At which stage is most of the reduced NADP oxidised?

11. During photosynthesis, which process releases electrons to reduce the chlorophyll molecules?
A) Photolysis of water
B) Phosphorylation of ADP
C) Oxidation of reduced NADP
D) Activation of Photosystem I

12. A plant tissue with water potential of -800kPa, is placed in four different solutions. Which solution induces full plasmolysis within the tissue?

Solution	Water potential
A)	-1200kPa
B)	-700kPa
C)	-300kPa
D)	-800kPa

13. Which of the following statement is **TRUE** about a property of water?
A) The highest density of water occurs below its freezing point.
B) It acts as a universal solvent for non-polar molecules
C) At room temperatures, its molecules are bound together by ionic bonds
D) A relatively large amount of heat is needed to increase its temperature.

14. In the conversion of glucose to two molecules of pyruvate, which of the following **DOES NOT** take place?
A) Hydrolysis of ATP
B) phosphorylation of hexose
C) Reduction of NAD^+
D) release of CO_2

15. Which protein has a fibrous structure?
A) Collagen C) Haemoglobin
B) Glucagon D) Sucrase

Section B:

16. Diagram 4 shows the important components in the electron transport chain (ETC) in mitochondrial membrane.

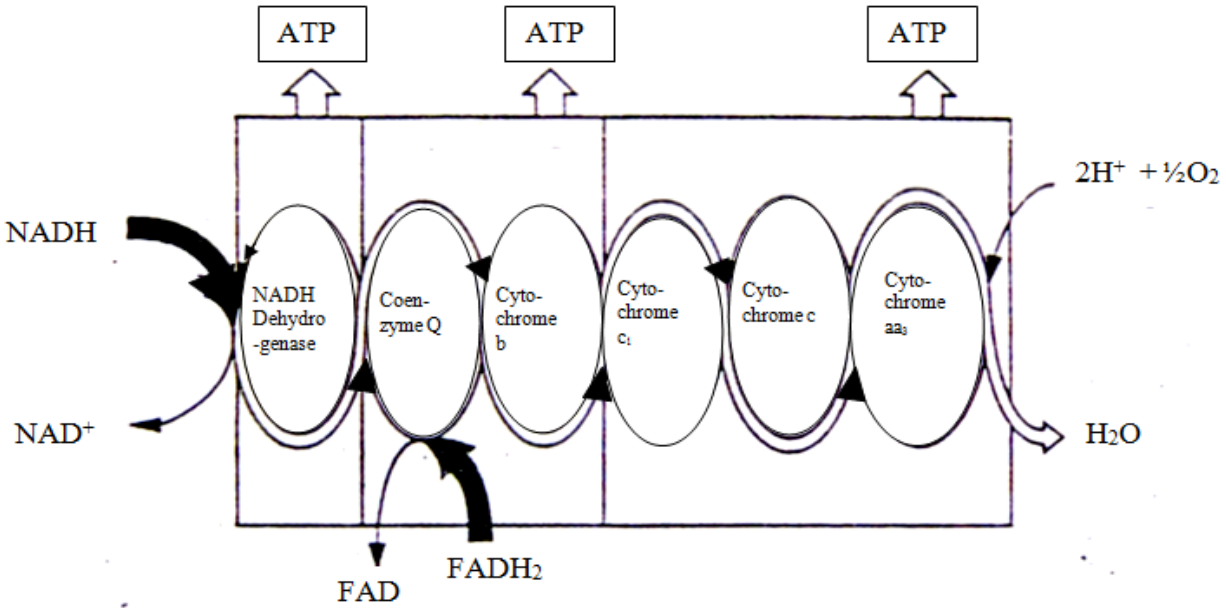


Diagram 4

a) Where is the source of $FADH_2$ and NADH? [2M]

$FADH_2$:

_____

NADH :

_____

b) Explain the role of [3M]

Coenzyme Q:

_____

Cytochrome b

_____

Cytochrome aa3

_____

c) State one other process that requires cytochrome. [1M]

_____

d) What is the importance of ETC? [1M]

_____

_____

17. Diagram 5 shows the drawing of ultrastructure of *E. coli*.

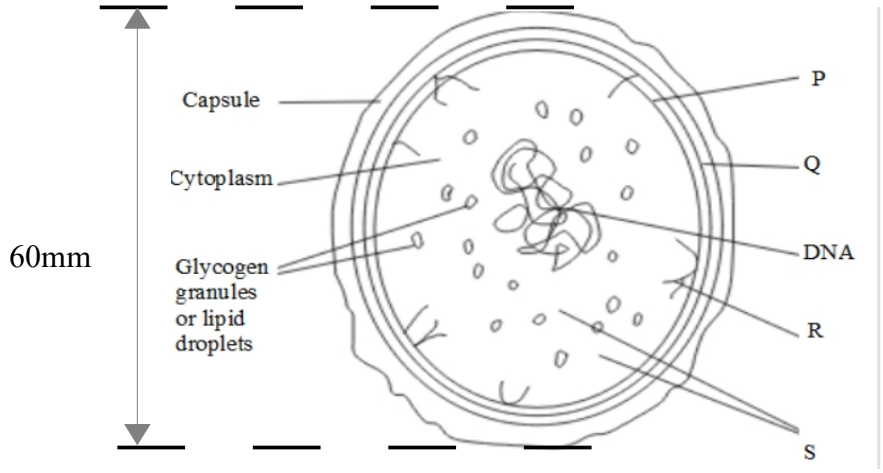


Diagram 5

a) Name structure P and Q. [2M]

P: _____

Q: _____

b) State a function of Structure R. [1M]

_____

c) Based on Diagram 5, state the shape of *E. coli*. [1M]

_____

d) Compare structure S found in prokaryotes and eukaryotes. [2M]

_____

_____

_____

e) If the apparent size of the cell is 5mm, the magnification of drawing of *E.coli* is 4800x, find the estimation of actual size of *E.coli* in µm. Show your working. [2M]

_____

_____

_____

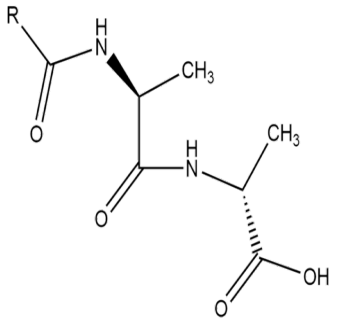
Section C: Answer any TWO questions only.

18. a) State the 3 principles of modern cell theory. [3M]
b) Explain the basic principles of transmission electron microscope used to examine a plant cell. [12M]

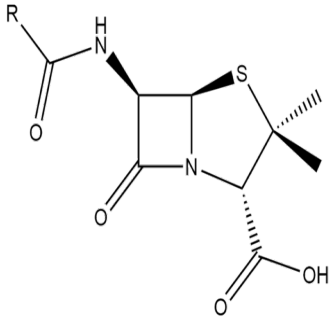
19. a) The chloroplasts in a plant cell have a mutation that causes hydrogen ions to diffuse directly through the phospholipid bilayer of the thylakoid membranes.
Explain how the mutation affects the rate of photosynthesis in the plant. [7M]
b) Explain how Pineapple plant carry out photosynthesis effectively. [8M]

20. a) D-ala-D-ala is essential for the bacteria to synthesis cell wall catalysed by transpeptidase.
Penicillin, extracted from fungi *Penicillium ascomycetous* is used to prevent bacteria infection.

Diagram below shows the structure of D-ala-D-ala and Penicilin



D-ala-D-ala



Penicillin

Explain how antibiotic Penicillin can be used to prevent bacteria infection. [7m]

b) Compare substrate level phosphorylation and oxidative phosphorylation. [5M]

c) Draw and label the structure of DNA, indicate the nucleoside on your drawing. [3M]

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Answer:
MCQ

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

16 ETC	
a. FADH2: derived from vitamin B2/ riboflavin	**1**
NADH : derived from vitamin B3/niacin/ nicotinic acid	**1**
bi. Coenzyme Q: Transfer H+ from FADH to cytochrome	**1**
ii. Cytochrome b: Transfer electron (from the hydrogen) to cytochrom c1 and c	**1**
iii. Cytochrome aa3 : merge/combine 2H and 2e to reduce oxygen (to form water)	**1**
c. Photosynthesis	**1**
d. to **increase the generation of energy ATP** from a complete breakdown of substrate molecule such as glucose or lipid.	**1** **(7M)**
17a. P: Plasma Membrane, Q: Cell wall	**2**
b. R: Mesosome contains enzymes for respiration/ involves in energy generation// cell wall synthesis	**1** **1**
c. Coccus/spherical shape	**1**
d. S found in prokaryotes are (smaller)70S ribosomes//free particles in cytoplasms whereas in eukaryotes they are (larger) 80S ribosomes//free particles in cytoplasms and attached to ER Site of/involved in protein synthesis	**1**
$\text{Magnification of drawing} = \text{Magnification of eyepiece} \times \text{Magnification of objective lens} \times \frac{\text{Size of drawing}}{\text{Apparent size of object}}$	
e. actual size = apparent size / magnification of drawing = 5000/4800 = 1.0417	**1** **1** **(8M)**
18a principle of modern cell theory	
1. all living things are made of cells, they are the basic units of life	**1**
2. new cells are formed from cells which already exist by a process of cell division and hereditary information is passed on from cell to cell during this process	**1**
3. the chemical reactions that create life occur within cells and they all have the same basic chemical composition	**1** **(3M)**
18b TEM	
1. Prepare **ultra thin dehydrated** plant cell specimen	**1**
2. The specimen is treated with atoms of **heavy metals** such as osmium tetraoxide, lead acetate or uranyl which attach to certain cellular structures.	**1**
3. The specimen must be placed in a **vacuum** to be viewed to minimise electron scattering due to collision between electrons	**1**
4. The finely sectioned specimen is **mounted on a Copper grid**	**1**
5. As the cathode heats up it **emits a beam of electron**.	**1**
6. These are **focussed by electromagnets** and pass through the specimen.	**1**
7. Further magnets focus the beam onto a **fluorescent screen**.	**1**
8. The **faster** the electrons reach the screen the **more the specimen fluoresces.**	**1**
9. Some parts of the specimen are **electron denser** than others so electrons do not pass evenly through the specimen.	**1**
10. Electron denser areas produce **darker** parts of the image on the screen//less electrons pass through and strike the screen, so there is **less fluorescence**	**1**
11. The transmission electron microscope has **high resolution which is 1.0nm**	**1**
12. A photograph taken using transmission electron microscope is called an **electron micrograph**.	**1**

	(12M)
19a) 1. (H^+ can move freely through the membrane)No active transport of H^+ from stroma into the thylakoid space 2. No accumulation of H^+ in thylakoid space 3. The thylakoid membrane is unable to generate an electrochemical/proton concentration gradient needed 4. No protons diffuse down the gradient through ATP synthase channel from thylakoid space into the stroma. 5. No ATP is generated via chemiosmosis 6. Dark reaction cannot be carried out without ATP 7. Hence, the rate of photosynthesis is reduced.	**1** **1** **1** **1** **1** **1** **1** **(7M)**
19b. 1. Pineapple is a CAM (Crassulacean Acid Metabolism) plant. 2. It increases the efficiency of photosynthesis by inhibiting photorespiration. 3. By increasing the CO_2 concentration in the stroma to increase the efficiency of RuBP carboxylase 4. During the day, stomata is closed and malate undergoes oxidative decarboxylation to form pyruvate and a CO_2 is released. 5. The CO_2 released is fixed by RuBP and entered Calvin cycle. 6. Pyruvate formed is converted to PEP 7. When the stomata is open during the night, Atmospheric CO_2 combined with PEP to form OAA. 8. OAA is reduced to Malate by NADPH	**1** **1** **1** **1** **1** **1** **1** **1** **(8M)**
20a. Competitive inhibition by penicilin 1. Penicillin and substrate D-ala-D-ala have **similar structure**. 2. It acts as a **competitive inhibitor** to the substrate. 3. It competes with D-ala-D-ala **for the same active site** of transpeptidase. 4. D-ala-D-ala is **prevented from binding** with the active site of transpeptidase. 5. Inhibiting the protein which cross-link peptidoglycan in the bacteria cell wall 6. Leading to lysis in bacteria. 7. Slow down the growth of bacteria and infection is prevented.	**1** **1** **1** **1** **1** **1** **1** **(7M)**
20b.	

Substrate level phosphorylation	Oxidative phosphorylation
Synthesis of ATP from ADP is an **endergonic reaction** which needs energy and enzyme	**1** **1**
Involves transfer of phosphate group from a phosphate-bearing intermediate/substrate directly to ADP form ATP	involving ATPase enzyme and chemiosmosis to form ATP from ADP **1**
Does not need oxygen	Need oxygen **1**
Occurs in **cytoplasm** (glycolysis) and **mitochondrion** (Krebs cycle)	Occurs in mitochondrion, in the **inner membrane/cristae** involving the (electron transport chain) **1**
Catalysed by enzyme **phosphorylase** (transferase)	Involves **ATPase** enzyme **1** **(Any 5 5M)**

Suka sampel ini?

Kertas Percubaan STPM

Sem 1 · Biologi

- Semester 1: kertas percubaan (trial) negeri, subjek yang dipilih + skema
- Blueprint 30 hari Semester 1 (setiap subjek)
- Semester 3: percubaan 2024, 10 subjek, banyak negeri, soalan + skema dalam satu fail

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