UNIVERSITY OF JOHANNESBURG

FACULTY OF SCIENCE

DEPARTMENT OF BIOTECHNOLOGY AND FOOD TECHNOLOGY

DIPLOMA IN BIOTECHNOLOGY

MODULE BIC12B1

Biochemistry 2

CAMPUS **DFC**

NOVEMBER FINAL ASSESSMENT 2021 MEMORANDUM

DATE: 05/11/2021 **TIME AVAILABLE: 24 HOURS**

ASSESSOR(S): **DR K KONDIAH**

INTERNAL MODERATOR **MR L ALAGIOZOGLOU**

DURATION: 90 MINS **MARKS: 40**

INSTRUCTIONS TO STUDENTS:

1. **ALL QUESTIONS ARE COMPULSORY.**
2. **THERE IS A 90 MINUTE TIMER ONCE STARTED.**
   NB:
   - **The test timer continues to run even when you are disconnected from the internet.**
   - **Contact the lecturer during working hours by WhatsApp with your full name and student number if you experience any technical difficulties.**
   - **If possible, do not close your browser or navigate away from the test if you lose connection. Send a screenshot to the lecturer during working hours with your full name and student number.**
3. **FAILURE TO SUBMIT YOUR ANSWERS WITHIN THE 90 MINUTE TIMER WILL RESULT IN A NON-SUBMISSION MARK OF ZERO.**
4. **GOOD LUCK!**

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1. Match the level of protein structure to the correct image shown below. (4)

I

II

III

IV

a) Primary
b) Secondary
c) Tertiary
d) Quarternary

I – D

II – A

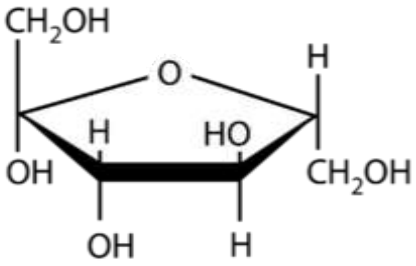
III – B

IV - D

2. Which of the following statements is false? (1)
   a) Polypeptides of >1000 residues are preferred in cells because they are more stable.
   b) The hydropathies of amino acid side residues influence the stability of a protein structure.
   c) Proteins can be denatured and renatured.
   d) Large polypeptide chains fold into structurally independent domains.

3. Protomers are non-identical polypeptides of multisubunit proteins. (1)
   a) True
   b) False

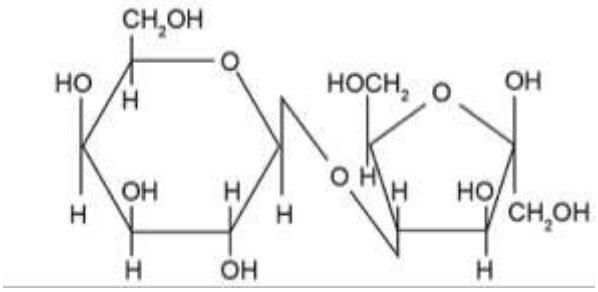
4. Select all the options with the correct description for fructose shown below. (3)



fructose

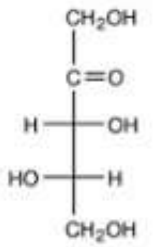
   a) Ketopentose
   b) Ketohexose
   c) Aldohexose
   d) Aldopentose
   e) Furanose
   f) Pyranose
   g) β anomer
   h) α anomer

5. Select all the statements in the options provided that are true about lactulose (galactose and fructose) shown below. (3)

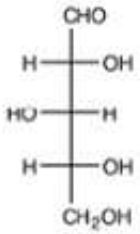


   a) Lactulose is a heteropolysaccharide.
   b) The furanose is a β anomer.
   c) Galactose is linked to fructose by a 1 → 3 glycosidic bond.
   d) Lactulose is a reducing sugar.
   e) Galactose is β anomer
   f) Galactose is a ketohexose
   g) The monomers are joined together by a N-glycosidic bond.

6. According to Fischer convention, sugar A is in the _____ configuration and sugar B in the _____ configuration. (1)



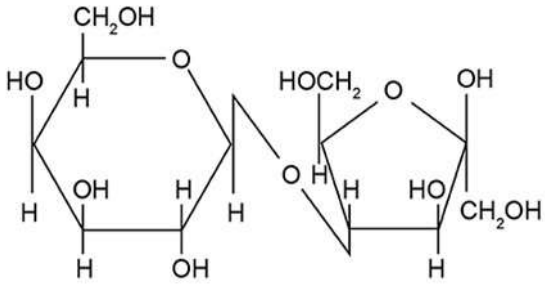
A



B

a) Aldose; Ketose
b) Ketose; Aldose
c) D; L
d) L; D

7. What is the systematic name for lactulose (galactose and fructose) shown below? (1)



a) β-galactopyranosyl – (1→3)-β-fructofuranoside
b) β-galactopyranosyl – (1→4)-β-fructofuranoside
c) α-galactopyranosyl –(1→4)-α-fructofuranoside
d) β-galactopyranosyl –(1→2)-α-fructofuranoside

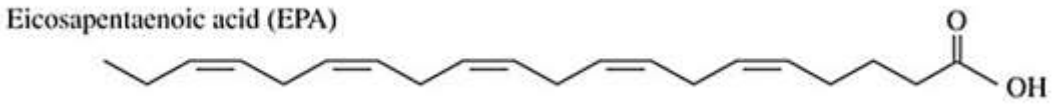
8. Match the following polysaccharides with their characteristics.
Note: Some options may be used more than once and some options may not be used at all. (7)

I. Glycogen
II. Peptidoglycan
III. Chitin

a) Heteropolysaccharide
b) Homopolysaccharide
c) β 1→4 linkage
d) Branched

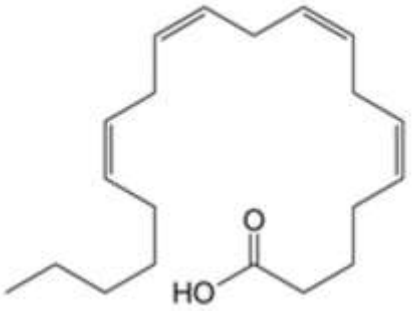
Glycogen – B, D
Peptidoglycan – A, C, D
Chitin – B, C

9. Select <u>all</u> the options that best describe the fatty acid shown below. (4)



a) It is a polyunsaturated fatty acid.
b) It has 18 carbon atoms.
c) It is a liquid at room temperature.
d) It is dissolves in methanol.
e) It can be classified as an essential fatty acid.
f) Another name for it is cholesterol.
g) Another name for it is ω-9.

10. The systematic name of the fatty acid below is (1)



a) 19:4 n-4
b) 19:4 n-6
c) 20:4 n-4
d) 20:4 n-6

11. Which of the following statements is true about triacylglycerols? (1)
a) They are amphiphilic.
b) They form part of the cell membrane.
c) They produce less energy than carbohydrates.
d) They are found in adipocytes.

12. Polyunsaturated fats increase LDL cholesterol in our bodies. (1)
a) True
b) False

13. Glycerophospholipids regularly exhibit flip-flop movement within the cell membrane. (1)
a) True
b) False

14. If the transition temperature of glycerophospholipids in the cell membrane is 30 ^{o}C and the temperature surrounding the cell is 25 ^{o}C, the cell membrane will have a gel-like consistency. (1)
a) True
b) False

15. Mary's blood type is B+. She has an accident and is need of a blood transfusion. At the hospital she received blood type AB+. Explain Mary's reaction to the blood transfusion. (5)
    Mary's immune system reacts negatively towards the blood transfusion. Mary has anti-A antibodies circulating in her blood. When she received a transfusion, the anti-A antibodies recognised the A antigen on the transfused RBCs and bound to them causing the RBCs to agglutinate/clump. She can only receive blood from Type B or O donors.
16. Shaka weighs 70 kg and eats cakes and pastries three times a week. Benjamin also weighs 70 kgs and prefers to eat peanuts and pumpkin seeds. Which of them is prone to heart disease? Explain your answer. (5)
    Shaka is prone to heart disease. Cakes and pastries are high in saturated fats which prevent the removal of LDL cholesterol from the body by the liver. The LDL cholesterol then accumulates in the blood and is deposited in the blood vessels where it hardens into plaques. Build-up of plaques blocks the blood vessels and makes them rigid. Peanuts and seeds are rich in polyunsaturated fats which lower LDL cholesterol.