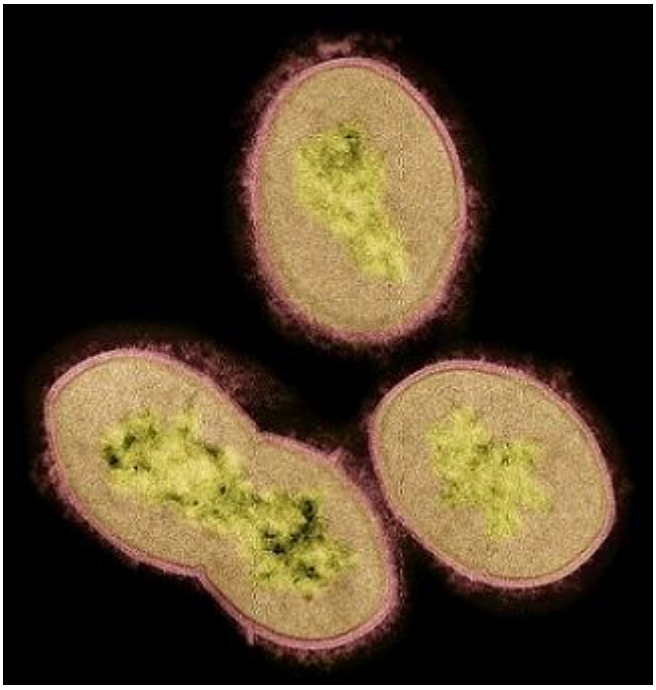
Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

The figure below shows a transmission electron microscope (TEM) image of three *Streptococcus* bacteria.



(a) Describe how the appearance of the area containing DNA in a TEM image of a eukaryotic cell would differ from that shown in the figure.

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(2)

(b) Describe **one** difference between the structure of DNA in a prokaryotic cell and in a eukaryotic cell.

_____

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_____

(1)

(c) *Streptococcus* bacteria can infect the lungs when air is breathed in and cause lung disease.

Describe the mechanism of breathing that causes air to enter the lungs.

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(3)

(d) Some strains of *Streptococcus* bacteria are more likely to cause lung disease than other strains.

Strains that do not cause lung disease are quickly destroyed by phagocytes. Phagocytes are stimulated when they bind to murein on *Streptococcus* bacteria.

Each strain of *Streptococcus* bacteria has a capsule of different thickness from the others.

Suggest how *Streptococcus* bacteria with a thicker capsule are more likely to survive **and** so cause lung disease.

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(2)

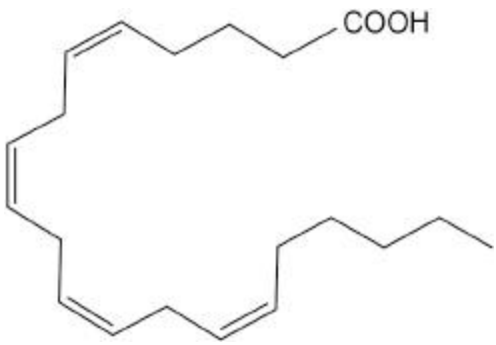
(Total 8 marks)

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Q2.

(a) **Figure 1** shows a fatty acid that contains 20 carbon atoms and four double bonds.

Figure 1

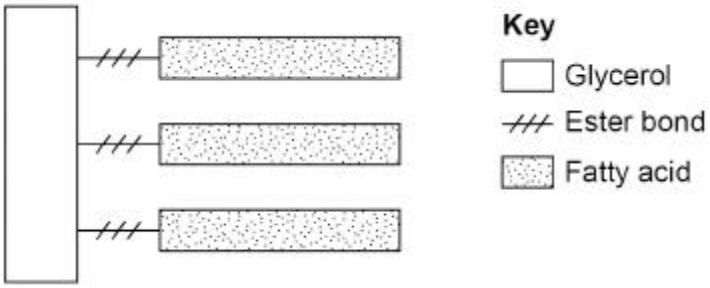


On **Figure 1**, draw a box around the R group of the fatty acid.

(1)

(b) **Figure 2** shows a triglyceride.

Figure 2



Describe **two** differences between the structure of the triglyceride shown in **Figure 2** and a phospholipid.

1 _____

_____

2 _____

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(2)

(c) Explain why phospholipids can form a bilayer but triglycerides cannot.

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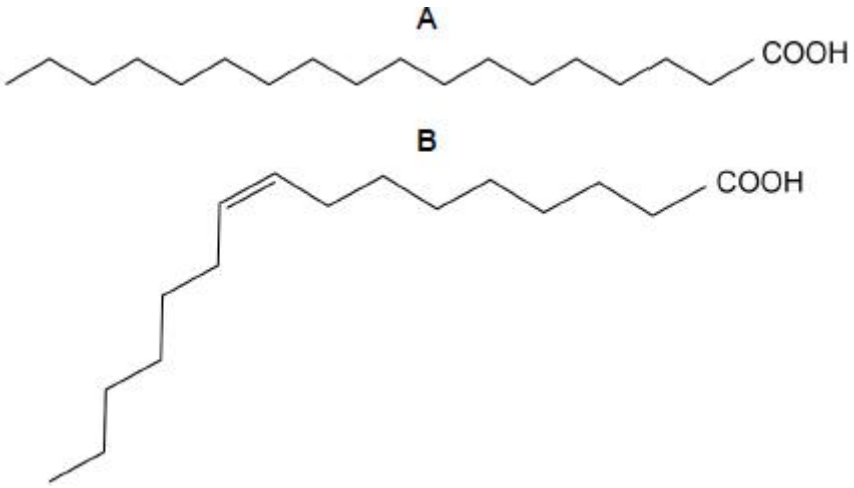
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(3)

(d) **Figure 3** shows two fatty acids, **A** and **B**.

Figure 3



Scientists fed rats a diet with added fish oil for 4 months.

They obtained samples of red blood cells from the rats before starting this diet (0 months) and after 4 months on this diet.

For each red blood cell sample, they separated the cell-surface membranes and measured:

- the percentage of phospholipids containing each of the fatty acids **A** and **B**
- the fluidity of the membrane.

The table below shows the scientists' results.

Time sample of red blood cells obtained / months	**Mean percentage of phospholipids containing fatty acid A**	**Mean percentage of phospholipids containing fatty acid B**	**Mean fluidity of the membrane / arbitrary units**
0	19.8	1.7	31
4	11.7	9.0	97

Suggest why the fluidity of the membrane was higher after 4 months.

Use all the information provided in the question.

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(3)

(Total 9 marks)

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