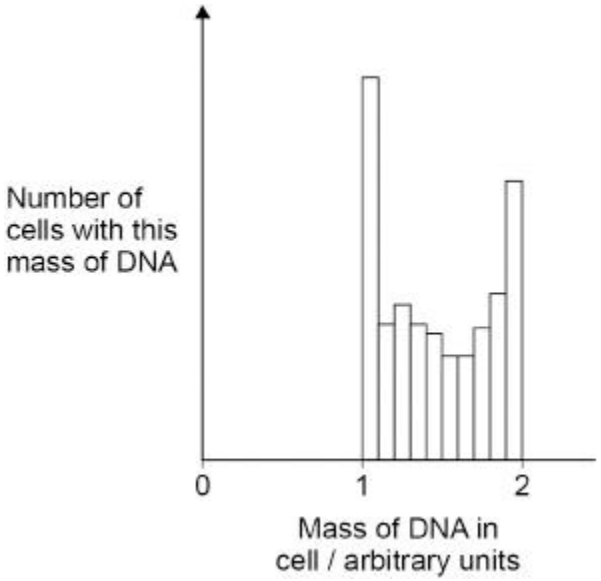
Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

(a) The figure below shows the mass of DNA present in a group of healthy cells.



Use your knowledge of the cell cycle to explain the results shown in the figure.

_____

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(b) Suggest **one** way the figure above would be different if these cells were tumour cells.

Justify your answer.

_____

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_____

_____

_____

_____

_____

(2)

(c) Describe the behaviour of chromosomes in prophase and metaphase of mitosis.

Prophase _____

_____

_____

Metaphase _____

_____

_____

(2)

(d) During anaphase, the spindle exerts 3×10^{-11} N of force on each chromatid. This force generates 6×10^{-19} W of power.

Calculate the speed of movement, in nm s^{-1}, of one chromatid during anaphase using the following equation:

$$P = F \times V$$

Where P = power in W
F = force in N
V = speed in m s^{-1}

Show your working.

Answer _____ nm s^{-1}

(2)

(Total 9 marks)

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Q2.

(a) Define genome and proteome.

Genome _____

_____

_____

Proteome _____

_____

_____

(2)

The classification system used in the early 20th century grouped different species of bacteria according to the position and shape of flagella on bacterial cells and by the number of flagella per cell. These were observed using an optical microscope.
Each species of bacterium has a characteristic cell shape and arrangement of flagella. These characteristics may be shared with other species within a genus.
Flagella are fragile, difficult to stain and may extend from the cell at any angle.

(b) Consider the accuracy and limitations of the early classification of bacteria using the arrangement of flagella.

_____

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(c) Suggest why several bacterial species have been renamed in recent years.

_____

_____

_____

(1)

(d) The figure below shows an image from an optical microscope of a single bacterial cell.

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This bacterial cell is 2.3 μm long (excluding the flagellum).

Calculate the magnification of this image.

Show your working.

Magnification × _____

(2)

(Total 8 marks)

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