

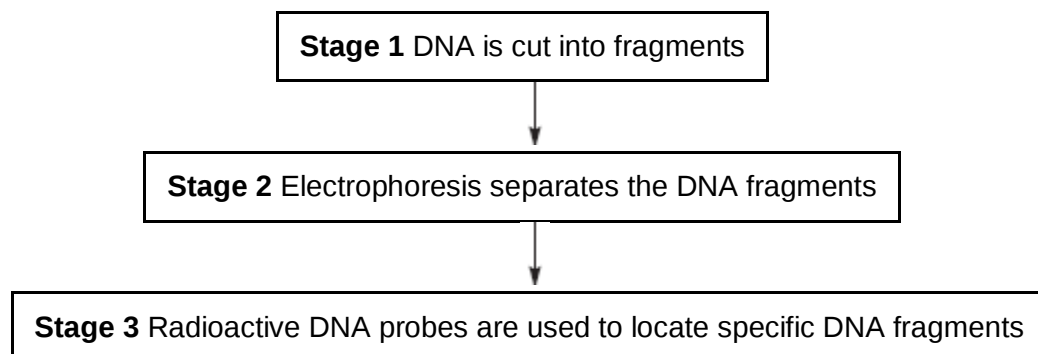
Name of the Student: _____

Max. Marks : 22 Marks

Time : 22 Minutes

Q1.

DNA probes may be used to identify the presence of specific genes associated with human diseases. The flow chart summarises the way in which they are used.



(a) Name the enzyme used in **Stage 1**.

(1)

(b) Explain how electrophoresis separates the fragments of DNA in **Stage 2**.

(2)

(c) (i) What is a *DNA probe*?

(2)

(ii) Explain why *radioactive* DNA probes are used to locate specific DNA fragments.

(2)
(Total 7 marks)

Q2.

Read the following passage.

DNA tests were used to confirm the identity of deposed Iraqi leader Saddam Hussein, after his capture in December 2003. DNA tests were carried out to prove the suspect was not one of the many alleged “look alikes” of the former leader.

5 Firstly, the DNA was extracted from the mouth of the captured man using a swab. Great care was taken to check that the swab did not become contaminated with any other DNA. DNA extracted from the swab was then subjected to a standard technique called the polymerase chain reaction (PCR), which takes a couple of hours. Lastly, the sample was “typed” to give the genetic fingerprint. This was produced within 24 hours of Saddam Hussein’s capture. Tests for use in criminal cases often take much longer because samples are very small or
10 contaminated.

It appears that Hussein’s genetic fingerprint was already stored away for comparison. This was obtained from personal items such as his toothbrush. DNA from the toothbrush would have been subjected to PCR before a DNA fingerprint could have been obtained.

Source: adapted from SHAONI BHATTACHARYA, *New Scientist* 15 December, 2003

Use information from the passage and your own knowledge to answer the questions.

- (a) Describe how the technique of genetic fingerprinting is carried out and explain how it can be used to identify a person, such as Saddam Hussein.

(6)

- (b) Explain how DNA could be present on a toothbrush (line 12).

(2)

- (c) (i) Explain why the polymerase chain reaction was used on the sample of DNA from the toothbrush (lines 12-13).

(2)

- (ii) Explain **one** way in which the polymerase chain reaction differs from DNA replication in a cell.

(2)

- (d) Tests for use in criminal cases often take much longer because samples are very small or contaminated (lines 8-10). Explain why it takes longer to obtain a genetic fingerprint if the sample is

- (i) very small;

(1)

- (ii) contaminated.

(2)

(Total 15 marks)