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

Q1.

(a) Suggest, with a reason, which type of radiation is likely to be the most appropriate for the sterilisation of metallic surgical instruments.

_____

_____

_____

(1)

(b) Explain why the public need not worry that irradiated surgical instruments become radioactive once sterilised.

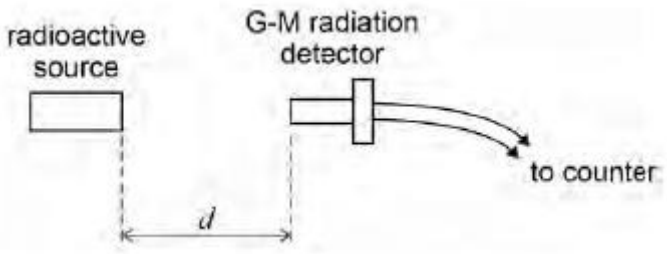
_____

_____

_____

(1)

(c) A student detects the counts from a radioactive source using a G-M radiation detector as shown in the diagram.



The student measures the count rate for three different distances d. The table shows the count rate, in counts per minute, corrected for background for each of these distances.

***d*/m**	**Corrected count rate / counts per minute**			
0.20	9013			
0.50	1395			
1.00	242			

Downloaded from www.merit-minds.com

Explain, with the aid of suitable calculations, why the data in the table are **not** consistent with an inverse-square law. You may use the blank columns for your working.

_____

_____

_____

_____

(2)

(d) State **two** possible reasons why the results do **not** follow the expected inverse-square law.

Reason 1 _____

_____

Reason 2 _____

_____

(2)

(Total 6 marks)

Q2.

The core of a thermal nuclear reactor contains a number of components that are exposed to moving neutrons.

(a) State what happens to a neutron that is incident on the moderator.

_____

_____

(1)

(b) State what happens to a neutron that is incident on a control rod.

_____

_____

(1)

(c) A slow-moving neutron is in collision with a nucleus of an atom of the fuel which causes fission.

Describe what happens in the process.

_____

_____

_____

Downloaded from www.merit-minds.com

_____

_____

_____

_____

_____

(3)

(d) A thermal nuclear reactor produces radioactive waste.

State the source of this waste and discuss some of the problems faced in dealing with the waste at various stages of its treatment.

Your answer should include:

- the main source of the most dangerous waste
- a brief outline of how waste is treated
- problems faced in dealing with the waste, with suggestions for overcoming these problems.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(6)

(Total 11 marks)

Downloaded from www.merit-minds.com