Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Mark Schemes

Q1.

(a) (i) (nuclear) fission is the splitting of a (large atomic) nucleus
*do **not** accept particle/atom for nucleus*
1

(nuclear) fusion is the joining of (two atomic) nuclei (to form a larger one)
do not accept particles/atoms for nuclei
1

(ii) energy
accept heat/radiation/nuclear energy
accept gamma (radiation)
do not accept neutrons/neutrinos
1

(b) (i) uranium (–235)
accept U (–235)
ignore any numbers given with uranium
accept thorium
accept MOX (mixed oxide)
*do **not** accept hydrogen*
1

(ii) (same) number of protons
accept (same) atomic number
accept (same) positive charge
ignore reference to number of electrons
1

[5]

Q2.

(a) (i) 1.25 (mSv)
1

(ii) any **two** from:

- (frequent) flying
  accept stated occupation that involves flying
- living at altitude
- living in areas with high radon concentrations

accept a specific area, eg Cornwall

- living in a building made from granite (blocks)
- having more than the average number of X-rays
  or
  having a CT scan
  accept more medical treatments
- working in a nuclear power station
  accept any suggestion that could reasonably increase the level from a specific source

2

(b) (i) to be able to see the effect of exposure (to radon gas)
or
as a control
accept to compare (the effect of) exposure (with no exposure)

1

(ii) increased levels of exposure increases the risk (of developing cancer)
accept exposure (to radon gas) increases the risk

1

smoking increases the (harmful) effect of radon
answers that simply reproduce statistics are insufficient

1

(c) LNT model – risk increases with increasing radiation (dose) level
accept in (direct) proportion
accept low doses increase the risk

1

Radiation hormesis - low radiation (dose) levels reduce the risk

1

(d) two valid points made – examples:

- animals have no choice and so should not be used
- should not make animals suffer
- better to experiment on animals than humans
- experiments lead to a better understanding / new knowledge
- experiments may lead to health improvement / cures for humans
  results for animals may not apply to humans is insufficient

2

[10]

Q3.

(a) (i) 200 to 50
accept either order

1

(ii) 5.3
accept values between 5.2 and 5.4 inclusive

1

(iii) 5.3

accept values between 5.2 and 5.4 inclusive

or

their (a)(ii)

1

(b) (i) Make the conveyor belt move more slowly

1

(ii) lead

1

(c) Exposure increased the content of some types of vitamin.

1

[6]