

Name of the Student: _____

Max. Marks : 27 Marks

Time : 27 Minutes

Mark Schemes

Q1.

(a) any **four** from:

similarities:

(both) heat water to produce steam (which turns a turbine linked to turning a generator)

(both are) reliable / can generate electricity 24 hours per day.

allow (both) provide base load energy / power

differences:

- nuclear power uses nuclear fission to release energy
- fossil fuels are burnt
- fossil fuels releases carbon dioxide
- nuclear fuels produce radioactive waste
- nuclear fuels generate more energy per kilogram.

allow nuclear fuels transfer nuclear energy to thermal / electrical energy but fossil fuels transfer chemical energy to thermal / electrical energy

for full marks similarities and differences must be given

ignore they are both non-renewable

4

(b) (i) any **two** from:

- nuclear power stations have high commissioning / decommissioning costs
allow fossil fuel power stations do not have high commissioning / decommissioning costs

- nuclear fuels produce radioactive waste

allow there is no radioactive waste produced from fossil fuels

- storage / disposal of (nuclear) waste a problem.

ignore cost and availability of fuel

allow (nuclear) waste takes many years to decay

allow nuclear power stations have a longer start-up time

allow for 2 marks (nuclear) waste stays radioactive for many years

2

(ii) any **two** from:

- an increase in use of renewable energy sources

allow increased use of nuclear fuels

allow named examples of renewable energy sources

- supply of fossil fuels is decreasing
- improved technologies for storing (nuclear) waste **or** decommissioning of (nuclear) power stations
- to meet targets for reduction of greenhouse gases.

allow to reduce carbon dioxide emissions

allow for 2 marks: fossil fuels will become more expensive as the supply decreases.

2

(c) to increase the voltage

*do **not** allow power / energy for voltage or current*

1

(so) reduce current

1

(which) reduces energy losses (due to heating effects in the cables)

allow "heat" for energy

allow more efficient energy transfer / transmission

*do **not** allow stops energy losses*

1

(d) any **three** from:

- chemicals used are a risk to health

eg contaminated water supply may make people ill

- (more) traffic on the roads would cause pollution / danger to locals
- (Earth tremors) could damage buildings / houses
- the sites may spoil the landscape / destroy habitats
- the sites may devalue properties
- money will be spent on fossil fuels rather than renewables so CO₂ emissions don't reduce.

no credit given for just repeating points given in the question.

3

[14]

Q2.

(a) diode

accept LED

1

(b) all symbols correct

must include at least voltmeter and diode

1



diode

allow ecf from part (a) if the component is not identified as a diode

allow symbol without the line through triangle

ignore polarity of diode

voltmeter in parallel with component added in series

*any additional components must not affect the ability to measure **V** and **I** for the diode / their (a)*

1

(c) (i) 0.05

accept 50 mA

accept between 0.048 and 0.050 inclusive

1

(ii) 16

$$\frac{0.8}{0.05}$$

their (c)(i) correctly calculated gains both marks

allow **1** mark for correct transformation and substitution

$$\frac{0.8}{0.05} \text{ or } \frac{0.8}{\text{their (c)(i)}}$$

allow 17 if using 0.048

2

[6]

Q3.

(a) 35

an answer with more than 2 sig figs that rounds to 35 gains **2** marks

allow **2** marks for correct method, ie $\frac{230}{6.5}$

allow **1** mark for $I = 6.5$ (A) **or** $R = \frac{230}{26}$

an answer 8.8 gains **2** marks

an answer with more than 2 sig figs that rounds to 8.8 gains **1** mark

3

- (b) (maximum) current exceeds maximum safe current for a 2.5 mm^2 wire
accept power exceeds maximum safe power for a 2.5 mm^2 wire

or

(maximum) current exceeds 20 (A)

(maximum) current = 26 (A) is insufficient

1

a 2.5 mm^2 wire would overheat / melt

accept socket for wire

do **not** accept plug for wire

1

- (c) a.c. is constantly changing direction
accept a.c. flows in two directions
accept a.c. changes direction
a.c. travels in different directions is insufficient

1

d.c. flows in one direction only

1

[7]