Oxford Cambridge and RSA

GCSE Physics B (Twenty First Century Science)

J259/02 Depth in physics (Foundation Tier)

Question Set 32

1 Electricity is transferred from power stations to consumers by the National Grid, as shown in **Fig. 1.1.**

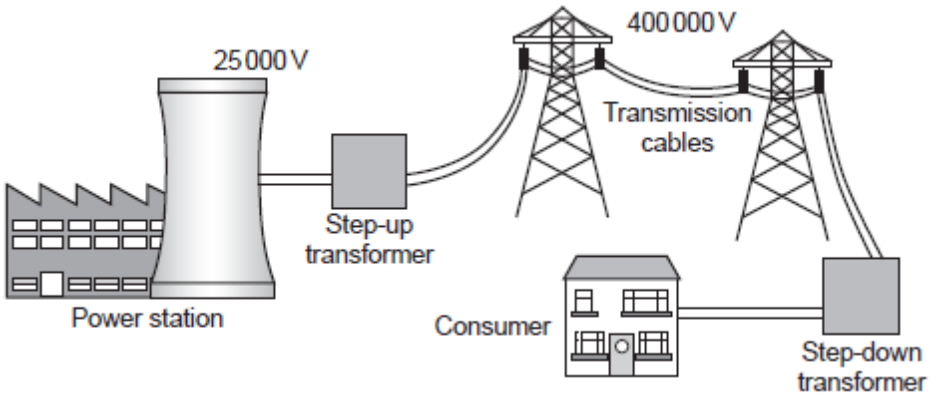

Fig 1.1

(a) The National Grid uses a step-up transformer to increase the potential difference from 25 000 V to 400 000 V before the current is sent along the transmission cables.

The current in the primary coil of the step-up transformer is 2000A.

Calculate the current flowing in the secondary coil of the step-up transformer.

Use the Data Sheet.

Current = ... A **[3]**

(b) **Fig. 1.2** shows the UK's demand for electricity during a 24 hour period, and the base load.

The base load is the amount of electricity which is constantly generated.

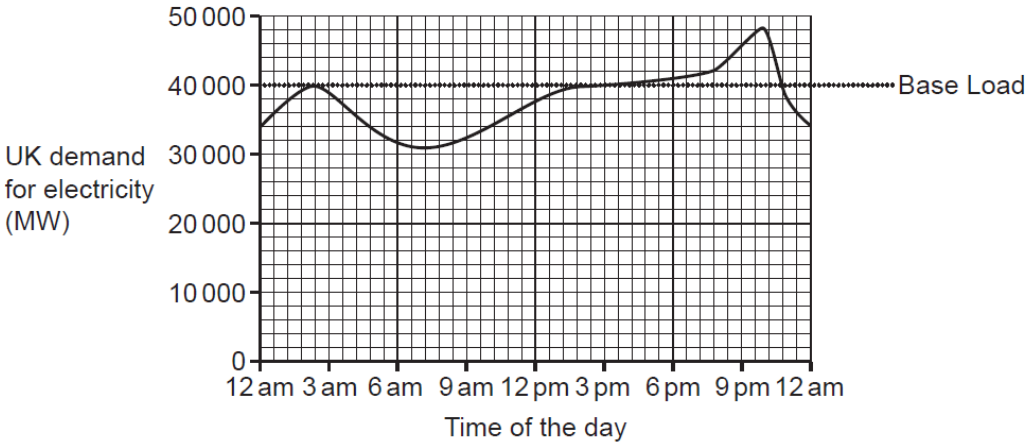

Fig. 1.2

(i) What is the value of the base load?

..... MW **[1]**

(ii) At which approximate time of the day is the demand for electricity the greatest? **[1]**

(iii) At which approximate time of the day does the demand for electricity become greater than the base load?

Put a ring around the correct answer.

2.30am 7am 4pm 10.30pm **[1]**

(c)* The UK uses many types of power stations to meet electrical demand.

The table shows information about four types of power station.

Type of power station	Start-up time	Maximum power generated (MW)
Wind	10 minutes	14 000
Fossil fuel	1 to 2 days	38 000
Solar	Instant	5 000
Hydroelectric	1 minute	5 000

Describe the **advantages** and **disadvantages** of these four types of power station and **conclude** how these four types of power station could be used to meet electrical demand during the 24-hour period shown in **Fig. 1.2**.

Use your own knowledge of these four types of power station in your answer. **[6]**

Total Marks for Question Set 32: 12

Resource Materials

Equations in Physics

change in internal energy = mass × specific heat capacity × change in temperature

energy to cause a change in state = mass × specific latent heat

for gases: pressure × volume = constant
(for a given mass of gas and at a constant temperature)

$(\text{final speed})^2 - (\text{initial speed})^2 = 2 \times \text{acceleration} \times \text{distance}$

energy stored in a stretched spring = ½ × spring constant × $(\text{extension})^2$

potential difference across primary coil × current in primary coil =
potential difference across secondary coil × current in secondary coil

Higher tier only –

pressure due to a column of liquid = height of column × density of liquid × g

force = magnetic flux density × current × length of conductor

potential difference across primary coil ÷ potential difference across secondary coil = number of turns in primary coil ÷ number of turns in secondary coil

change in momentum = resultant force × time for which it acts