Oxford Cambridge and RSA

GCSE Physics B (Twenty First Century Science)

J259/04 Depth in physics (Higher Tier)

Question Set 22

1 Electricity is transferred from power stations to consumers by the National Grid, as shown in **Fig. 2.1.**

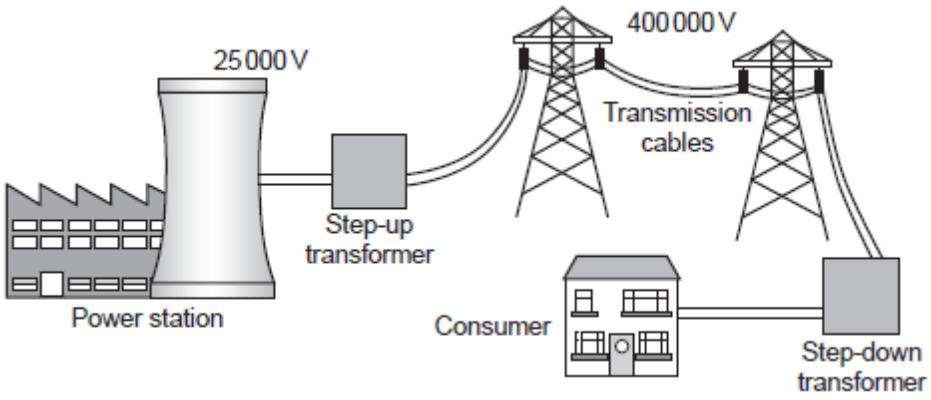

Fig 2.1

(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.

[3]

Current = ... A

(b) **Fig. 2.2** 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.

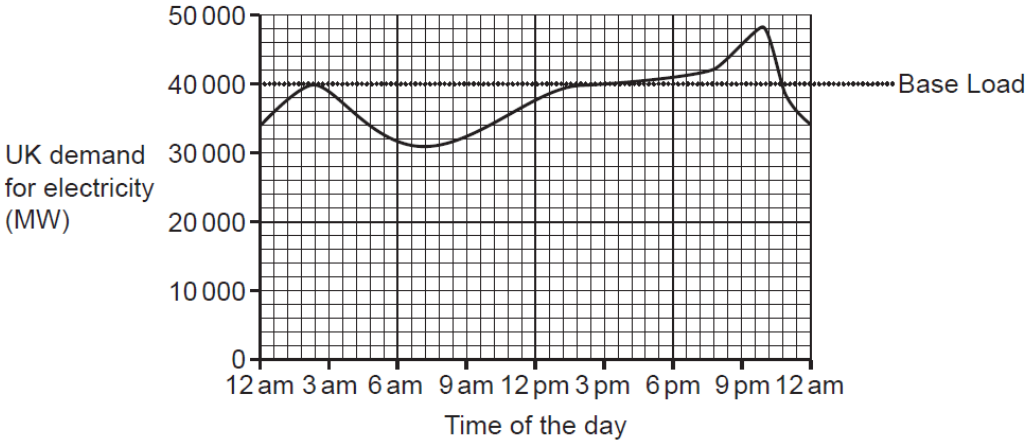

Fig. 2.2

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

[1]

..... MW

(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. 2.2**.

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

Total Marks for Question Set 22: 12

Resource Materials

Question Set No: 22

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

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