OCR (A) Physics A-level

PAG 11.1 - Investigating Transformers

Practical Flashcards

What is the difference between a step-up and a step-down transformer?

What is the difference between a step-up and a step-down transformer?

Step-up transformers have a greater voltage across their secondary coil, whereas step-down transformers have a have a greater voltage across their primary coil.

What is the benefit of using laminated cores in a transformer?

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The addition of lamination layers reduces the eddy currents in the core. This improves the efficiency of the transformer since less energy is wasted.

What is the benefit of using a magnetically soft material for the transformer core?

What is the benefit of using a magnetically soft material for the transformer core?

Magnetically soft materials can be easily magnetised and demagnetised. This will improve the efficiency of the transformer, since less energy will be wasted in magnetising and demagnetising the core.

How can the power input of your transformer be calculated?

How can the power input of your transformer be calculated?

The power input will equal the product of the input current and the input voltage.

How can the efficiency of your transformer be calculated?

How can the efficiency of your transformer be calculated?

$$\frac{I_s V_s}{I_p V_p}$$

Why will the efficiency of your transformer not be 100%?

Why will the efficiency of your transformer not be 100%?

Energy will be dissipated to the surroundings due to eddy currents in the core and the heating of the coils of wire.

How can the energy losses in the coils of wire be reduced?

How can the energy losses in the coils of wire be reduced?

The resistance of the wire can be reduced by using thick copper wire. This will result in the coils heating up less, and therefore less energy being wasted.

What does Faraday's law state?

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Faraday's law states that an induced emf will be directly proportional to the rate of change of the flux linkage.

What is an AC power supply?

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An AC (alternating current) power supply is a supply whose current is continually changing direction. This usually occurs at a set frequency.

Why must an A.C supply be used in this experiment?

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For an emf to be induced, there must be a constantly changing magnetic field since there needs to be a rate of change of flux linkage. This can only be achieved if the current is continually changing direction.

How do you calculate the turn ratio of a transformer?

How do you calculate the turn ratio of a transformer?

The turn ratio is obtained by dividing the number of turns on the secondary coil by the number of turns on the primary coil.

What is the relationship between the turn ratio and the voltage ratio for an ideal transformer?

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$$\frac{N_s}{N_p} = \frac{V_s}{V_p}$$

What is the relationship between the turn ratio and the current ratio for an ideal transformer?

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$$\frac{N_s}{N_p} = \frac{I_s}{I_p}$$

How is a magnetic field set up in the core of the transformer?

How is a magnetic field set up in the core of the transformer?

When a current flows through a wire, a magnetic field is induced around it. This means that when a current flows through the primary coil, the core will become magnetised.

What could you add to your circuit set-up to allow the current to be varied?

What could you add to your circuit set-up to allow the current to be varied?

A rheostat can be added to allow the current inputted into the primary coil to be varied.

What safety precautions should be taken in this experiment?

What safety precautions should be taken in this experiment?

The input voltage should be kept sufficiently low to ensure that the output voltage remains at a safe level, even when the secondary coil has a greater number of turns than the primary. The power supply should be switched off when not in use, to avoid the apparatus becoming too hot.