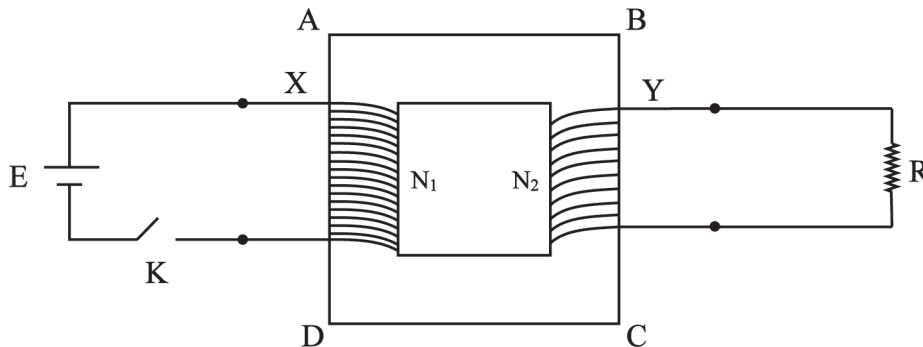


The coils marked as  $X$  and  $Y$  in the following figure have  $N_1$  number of turns and  $N_2$  number of turns respectively while  $ABCD$  is an iron medium.



- (a) (i) A current flows through the resistor  $R$  when the switch  $K$  was suddenly closed. Explain this phenomenon.

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- (ii) Draw the direction of the current in the above diagram.

- (iii) Write down the law used to determine the direction of current flowing through the resistor. (Marks will not be awarded for a mathematical equation.)

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- (iv) What is the main requirement of having a  $ABCD$  iron medium?

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- (b) An alternate current supply of voltage  $V_1$  was connected to the circuit instead of the battery and the key. Then the circuit was converted into a transformer by removing the resistor  $R$ . Obtain an expression for the voltage ( $V_2$ ) developed across the coil  $Y$  in terms of  $V_1$ ,  $N_1$  and  $N_2$ .

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**(c) In a normal transformer power loss due to formation of Eddy currents has been reduced by using a special medium.**

**(i) What kind of a medium is used in above transformers in order to reduce the power loss?**

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**(ii) Explain how the formation of Eddy currents in the medium stated in part (c) (i) above has been reduced.**

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**(d) (i) What type of a transformer is suitable for “Spot-welding”?**

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**(ii) Explain the reason for your choice.**

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