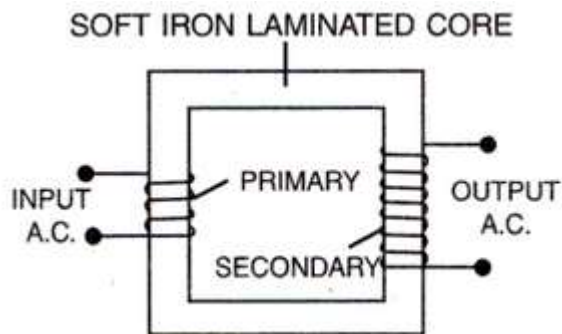

EMI, ALTERNATING CURRENT AND EM WAVES

17. Draw a schematic diagram of a step-up transformer.
[All India 2010, Delhi 2011C]
18. Sketch a schematic diagram depicting electric and magnetic fields for an electromagnetic wave propagating along the Z-direction.
[Delhi 2009]
19. An em wave is travelling in a medium with a velocity $\vec{v} = \hat{v}i$. Draw a sketch showing the propagation of the em wave, indicating the direction of the oscillating electric and magnetic fields.
[Delhi 2013]
20. Draw a graph to show variation of capacitive-reactance with frequency in an a.c. circuit.
[All India 2015]
21. Draw a schematic sketch of the electromagnetic waves propagating along the + x-axis. Indicate the directions of the electric and magnetic fields.
[All India 2015]
22. Draw a labelled diagram of a step-down transformer.
[All India 2016]
23. Draw a labelled diagram of an ac generator.
[All India 2017]
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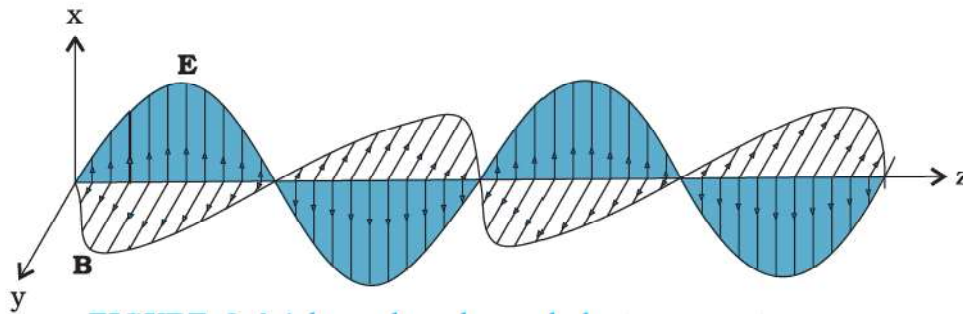


SOLUTIONS

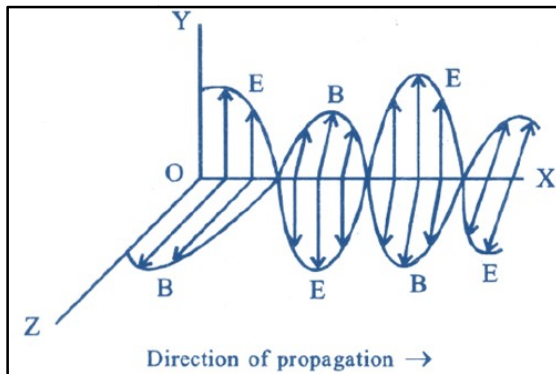
17. Schematic diagram of a step-up transformer.



18. A charge q oscillating at certain frequency produces an oscillating electric field in space, which produces an oscillating magnetic field. The oscillating electric and magnetic fields thus regenerate each other and produce electromagnetic wave. The frequency of the electromagnetic wave equals the frequency of oscillation of the charge.



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19. From $\vec{V} = \hat{V}_i$, it is clear that the wave is propagating along the x-axis. The direction of electric field is along the y-axis and that of the magnetic field along the z-axis.

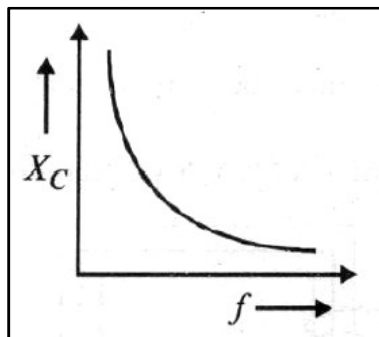


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20. Capacitive reactance

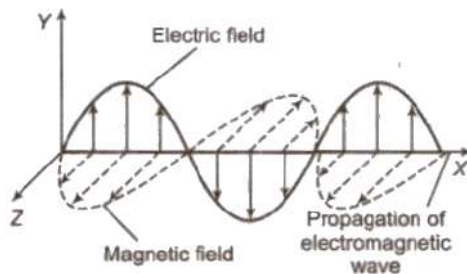
$$X_C = \frac{1}{\omega C} = \frac{1}{2\pi f C}$$

Therefore, it is inversely proportional to frequency f .

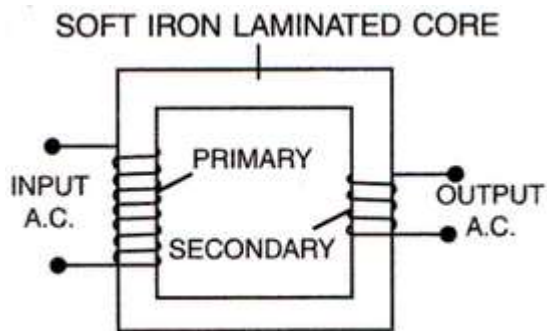
Graph: X_C versus f



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21. Schematic sketch of the electromagnetic waves:



22. A labelled diagram of a Step-down transformer



23. (a) AC Generator: It is used to convert mechanical energy into electrical energy.

Principle: It works on the principle of electromagnetic induction.

