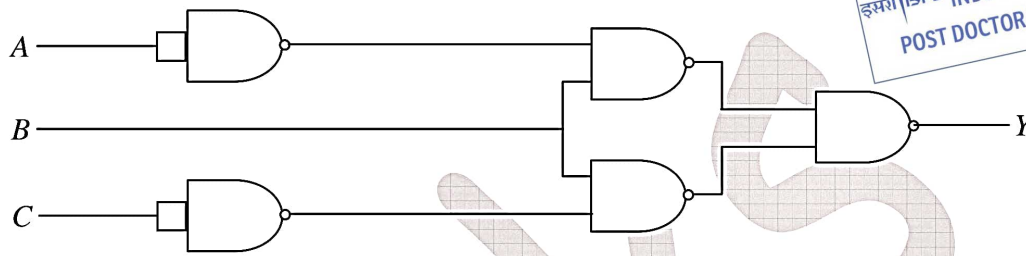


Q6. After the detonation of an atom bomb, the spherical ball of gas was found to be of 15 meter radius at a temperature of $3 \times 10^5 K$. Given the adiabatic expansion coefficient $\gamma = 5/3$, what will be the radius of the ball when its temperature reduces to $3 \times 10^3 K$?

- (a) 156m (b) 50m (c) 150m (d) 100m

Q7. What is Y for the circuit shown below?



- (a) $Y = \overline{(A + \bar{B})}(\bar{B} + C)$ (b) $Y = \overline{(A + \bar{B})}(B + C)$
 (c) $Y = \overline{(\bar{A} + B)}(\bar{B} + C)$ (d) $Y = \overline{(A + B)}(\bar{B} + C)$

Q8. What is the dimension of $\frac{\hbar \partial \psi}{i \partial x}$, where ψ is a wavefunction in two dimensions?

- (a) $kg m^{-1} s^{-2}$ (b) $kg s^{-2}$ (c) $kg m^2 s^{-2}$ (d) $kg s^{-1}$

Q9. A plane electromagnetic wave propagating in air with $\vec{E} = (8\hat{i} + 6\hat{j} + 5\hat{k})e^{i(\omega t + 3x - 4y)}$ is incident on a perfectly conducting slab positioned at $x = 0$. \vec{E} field of the reflected wave is

- (a) $(-8\hat{i} - 6\hat{j} - 5\hat{k})e^{i(\omega t + 3x + 4y)}$ (b) $(-8\hat{i} + 6\hat{j} - 5\hat{k})e^{i(\omega t + 3x + 4y)}$
 (c) $(-8\hat{i} + 6\hat{j} - 5\hat{k})e^{i(\omega t - 3x - 4y)}$ (d) $(-8\hat{i} - 6\hat{j} - 5\hat{k})e^{i(\omega t - 3x - 4y)}$

Q10. Let $\Lambda = \begin{pmatrix} 1 & 0 \\ 0 & 11 \end{pmatrix}$ and $M = \begin{pmatrix} 10 & 3i \\ -3i & 2 \end{pmatrix}$. Similarly, transformation of M to Λ can be performed by

- (a) $\frac{1}{\sqrt{10}} \begin{pmatrix} 1 & 3i \\ 3i & 1 \end{pmatrix}$ (b) $\frac{1}{\sqrt{9}} \begin{pmatrix} 1 & -3i \\ 3i & 11 \end{pmatrix}$

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