Practice Quiz 4 #1 PHYS1C6

1. Ans. C $\lambda = \frac{h}{p}$ $\Rightarrow$ same momentum gives same wavelength.

2. Ans. D $\lambda = \frac{h}{p} = \frac{h}{mv} = \frac{6.626\times10^{-34}}{0.1\times50} = 1.33\times10^{-34}$ (m) //

3. Ans. D $\Delta\lambda = \lambda' - \lambda_0 = \frac{h}{m_e c}(1-\cos\theta) = 2.43\times10^{-12}(1-\cos\theta)$ (unit in m)

$\Rightarrow (6.57\times10^{-12}) - (5.70\times10^{-12}) = 2.43\times10^{-12}(1-\cos\theta)$

$\Rightarrow \cos\theta = 0.642 \quad \therefore \theta = 50°$ //

4. Ans. E Refer to the textbook.

5. Ans. C $K_{max} = hf - \phi = h\cdot\frac{c}{\lambda} - \phi = \frac{6.626\times10^{-34}\times3\times10^{8}}{300\times10^{-9}} - 2.46\times1.6\times10^{-19}$

$= 6.626\times10^{-19} - 2.46\times1.6\times10^{-19} = 2.69\times10^{-19}$ (J) $= 1.68$ eV //

6. Ans. D $\phi = h\cdot f_{cutoff} \Rightarrow 2.46\times1.6\times10^{-19} = 6.626\times10^{-34}\times f_{cutoff}$

$\Rightarrow f_{cutoff} = 5.94\times10^{14}$ Hz $\therefore \lambda_{cutoff} = \frac{c}{f_{cutoff}} = 5.05\times10^{-7}$ (m) //

7. Ans. B $\lambda = \frac{h}{p} \propto \frac{1}{p}$

8. Ans. B Refer to the textbook.

9. Ans. D $\Delta x\,\Delta p \geq \frac{h}{4\pi}$

10. Ans. A $\Delta\lambda = \lambda' - \lambda_0 = \frac{h}{m_e c}(1-\cos\theta) = 2.43\times10^{-12}(1-\cos75°)$ (unit in m)

$\Rightarrow \lambda' - \lambda_0 = 1.80\times10^{-12}$ (m) $= \Delta\lambda$

$\therefore \lambda_0 = \frac{c}{f_0} = \frac{ch}{E} = \frac{3\times10^{8}\times6.626\times10^{-34}}{75\times10^{3}\times1.6\times10^{-19}} = 1.657\times10^{-11}$ (m)

$\therefore \lambda' = \lambda_0 + \Delta\lambda = 16.57\times10^{-12} + 1.8\times10^{-12} = 18.37\times10^{-12}$ (m) $= 1.84\times10^{-11}$ (m) //