### Week 7 Assignment 7

**The due date for submitting this assignment has passed.**

**Due on 2018-09-19, 23:59 IST.**

**As per our records you have not submitted this assignment.**

1) Consider different frequency interaction ($\omega_1 - \omega_2 = \omega_3$), where the corresponding to $\omega_1$ is treated as constant throughout the crystal (Undep pump approximation). The coupled amplitude equations for $\Delta k = 0$ are

$$\kappa_i = \left( \frac{\omega_i d_{eff}}{n_i c} \right)$$

\[
\begin{align*}
\frac{dA_1}{dz} &= ik_1 A_2 A_3 & \frac{dA_1}{dz} &= i\kappa_1 A_2 A_3^* \\
\frac{dA_2}{dz} &= ik_2 A_1 A_3^* & \frac{dA_2}{dz} &= i\kappa_2 A_1 A_3 \\
\frac{dA_3}{dz} &= ik_3 A_1 A_2^* & \frac{dA_3}{dz} &= i\kappa_3 A_1 A_2 \\
\end{align*}
\]

(a) (b) (c)

No, the answer is incorrect.

Score: 0

Accepted Answers:

(a)

2) For Q1 the governing equation for the field $A_2(z)$ is (where $\alpha = \sqrt{\kappa_2 \kappa_3 |A_1|^2}$)

\[
\begin{align*}
(a) \frac{d^2A_2}{dz^2} + \alpha^2 A_2 &= 0 & (b) \frac{d^2A_2}{dz^2} &= 0 & (c) \frac{d^2A_2}{dz^2} - \alpha A_2 &= 0 & (d) \frac{d^2A_2}{dz^2} - \alpha^2 A_2 &= 0 \\
\end{align*}
\]

(a) (b) (c) (d)

No, the answer is incorrect.

Score: 0

Accepted Answers:

(a)

3) For Q1 if the initial conditions are $A_1(0) = A_{10}$, $A_2(0) = A_{20}$ and $A_3(0) = 0$

(a) (b) (c) (d) (e) (f)

Score: 0

Accepted Answers:

(a)
4) For a sum frequency generation process \((\omega_l = \omega_p + \omega_s)\) if the angle between wave vector \(k_p\) and \(k_s\) is \(\psi\), then the angle between \(k_p\) and \(k_l\) is

\[
\begin{align*}
(a) \quad & \tan^{-1} \frac{(k_p/k_s) \sin \psi}{1 + (k_s/k_p) \cos \psi} \\
(b) \quad & \tan^{-1} \frac{(k_s/k_p) \sin \psi}{1 - (k_s/k_p) \cos \psi} \\
(c) \quad & \tan^{-1} \frac{(k_s/k_p) \sin \psi}{1 - (k_p/k_s) \cos \psi} \\
(d) \quad & \tan^{-1} \frac{(k_s/k_p) \sin \psi}{1 + (k_p/k_s) \cos \psi}
\end{align*}
\]

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a) (b) (c) (d)

5) For achieving noncollinear phase matching in a sum frequency generation process \((\omega_l = \omega_p + \omega_s)\) the angle between the wave vectors \(k_p\) and \(k_s\) is

\[
\begin{align*}
(a) \quad & \cos^{-1} \frac{k_p^2 + k_s^2 - k_l^2}{2k_pk_l} \\
(b) \quad & \cos^{-1} \frac{k_p^2 + k_s^2 - k_l^2}{2k_lk_s} \\
(c) \quad & \cos^{-1} \frac{k_p^2 + k_s^2 - k_l^2}{2k_pk_s}
\end{align*}
\]

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a) (b) (c)

6) A phase-matching configuration is possible in beta-barium borate (BBO) in two separate non-collinear beams at 1.064 \(\mu\m\) generate a second harmonic at 0.532 \(\mu\m\). Assuming the refractive indices are same for both the wavelength the angle between the two fundamental beams is

\[
\begin{align*}
(a) \quad & 180^\circ \\
(b) \quad & 40.06^\circ \\
(c) \quad & 30.1^\circ \\
(d) \quad & 90^\circ
\end{align*}
\]

No, the answer is incorrect.
A phase-matching configuration is possible in a crystal in which two separate non-collinear beams at 1.064 μm generate a second harmonic beam at 0.532 μm. If the effective refractive indices at the two wavelengths are 1.59400 and 1.51532 respectively, the angle between the two fundamental beams is (a) 180° (b) 140° (c) 92° (d) 0°

No, the answer is incorrect.

In optical parametric amplification process power is flowing (a) from lower frequency to the higher frequency (b) from higher frequency to the lower frequency (c) no energy transfer takes place

No, the answer is incorrect.

Degenerate parametric amplification process is exactly opposite to (a) SHG (b) DFG (c) electro optic effect (d) none of these

No, the answer is incorrect.

For type-I phase matching which of the following is for positive uniaxial crystal: (a) e → o + o (b) e → e + o (c) o → o + e (d) o → e + e

No, the answer is incorrect.