Unit 10 - Week 8

Week 8 Assignment 8

The due date for submitting this assignment has passed. **Due on 2018-09-26, 23:59 IST.**
As per our records you have not submitted this assignment.

1) *2 points*

For the process $\omega_p - \omega_s = \omega_i$ under undepleted pump approximation , governing equations of the fields corresponding to ω_s and ω_i are (where $\frac{\omega_x d_{eff}}{n_x c}$)

(a) $\frac{dA_s}{dz} = i\kappa_s A_p A_i^*$, $\frac{dA_i}{dz} = i\kappa_i A_p A_s^*$

(b) $\frac{dA_s}{dz} = i\kappa_s A_p^* A_i e^{i\Delta kz}$, $\frac{dA_i}{dz} = i\kappa_i A_p A_s^* e^{i\Delta kz}$

(c) $\frac{dA_s}{dz} = -i\kappa_s A_p A_i^* e^{i\Delta kz}$, $\frac{dA_i}{dz} = i\kappa_i A_p A_s^* e^{i\Delta kz}$

(d) $\frac{dA_s}{dz} = i\kappa_s A_p A_i^* e^{i\Delta kz}$, $\frac{dA_i}{dz} = i\kappa_i A_p A_s^* e^{i\Delta kz}$

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

No, the answer is incorrect.
Score: 0

Accepted Answers:
(d)

2) *2 points*

For Q1 the governing equation for the field corresponding to ω_s ($A_s(z$ $(where\ g^2 = \kappa_s\kappa_i|A_p|^2)$

(a) $\frac{d^2A_s}{dz^2} - i\Delta k\frac{dA_s}{dz} + g^2A_s = 0$

(b) $\frac{d^2A_s}{dz^2} + i\Delta k\frac{dA_s}{dz} - g^2A_s =$

(c) $\frac{d^2A_s}{dz^2} - g^2A_s = 0$

(d) $\frac{d^2A_s}{dz^2} - i\Delta k\frac{dA_s}{dz} - g^2A_s =$

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

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In a *Singly Resonant Oscillator* (SRO) the value of the frequency mode spacing (Δ when the length and refractive index of the nonlinear crystal, works as a cavity, ar cm and 1.75 respectively.

(a) 2.44 GHz (b) 0.61 GHz (c) 1.22 GHz (d) 0.305 GHz

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

No, the answer is incorrect.
Score: 0

Accepted Answers:
(a)

4) **2 points**

In a SRO the threshold gain is given as, $g_{th} = \frac{\sqrt{2}}{l}\left(\frac{1}{\sqrt{R_1 R_2}} - 1\right)^{1/2}$, the symbols h their usual meanings. The expression for threshold pump intensity (I_{th}) is

(a) $\frac{1}{2}\epsilon_0 c n_p \frac{c^2}{d^2}\left(\frac{n_p n_i}{\omega_s \omega_i}\right) g_{th}^2$ (b) $\frac{1}{2}\epsilon_0 c n_p \frac{c^2}{d^2}\left(\frac{n_s n_i}{\omega_p \omega_i}\right) g_{th}^2$

(c) $\frac{1}{2}\epsilon_0 c n_p \frac{c^2}{d^2}\left(\frac{n_s n_i}{\omega_s \omega_i}\right) g_{th}^2$ (d) $\frac{1}{2}\epsilon_0 c n_p \frac{c^2}{d^2}\left(\frac{n_s n_i}{\omega_s \omega_p}\right) g_{th}^2$

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

No, the answer is incorrect.
Score: 0

Accepted Answers:
(c)

5) **2 points**

The optical parametric oscillation (OPO) process takes place when

(a) $\omega_p = \omega_s + \omega_i$ (b) $k_p = k_s + k_i$

(c) $n_p \omega_p = n_s \omega_s + n_i \omega_i$ (d) both "(a)" and "(b)"

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

No, the answer is incorrect.
Score: 0

Accepted Answers:
(d)

6) **2 points**

In a Singly Resonant Oscillator (SRO) find out the wavelength spacing between th and 2nd mode when the length and refractive index of the nonlinear crystal, works cavity, are 5 cm and 2 respectively.

(a) 5 cm (b) 10 cm (c) 2.5 cm (d) 1.25 cm

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

No, the answer is incorrect.
Score: 0

Accepted Answers:
(b)

7) **2 points**

The threshold pump intensity of SRO in a crystal of length 2 cm. ($0.9\ \mu m; \lambda_s = 1.2\ \mu m. d_{eff} = 1.2\ pm/V$) is, (The refractive indices are same fo the wavelengths ($n = 1.7$). The reflectivity for both the mirrors are 0.9).

(a) 6.88 MW/cm^2 (b) 3.44 MW/cm^2 (c) 13.76 MW/cm^2 (d) 0.5 MW/cı

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

No, the answer is incorrect.
Score: 0

Accepted Answers:
(a)

8) **2 points**

The threshold gain parameter (g_{th}) of SRO in a crystal of length 1.5 cm is(reflectivity for both the mirrors are 0.9 and 0.95).

(a) 20.3 m^{-1} (b) 26.9 m^{-1} (c) 30.1 m^{-1} (d) 40.2 m^{-1}

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

No, the answer is incorrect.
Score: 0

Accepted Answers:
(b)

9) **2 points**

The threshold gain (g_{th}) for a DR-OPO for a 2 cm crystal is , if the mi reflectivity for the signal is 0.95 and idler is 0.6 .

(a) 14.14 m^{-1} (b) 26.9 m^{-1} (c)7.07 m^{-1} (d) 3.05 m^{-1}

- (a)
- (b)

(c)

(d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(c)

10) **2 points**

What is the ratio of the required pump power for the occurrence of a DRO pr and the SRO process if the reflectivity of the mirror for the idler is 0.70.

(a) 0.15 (b) 0.30 (c) 0.60 (d) 0.05

(a)

(b)

(c)

(d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(a)

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