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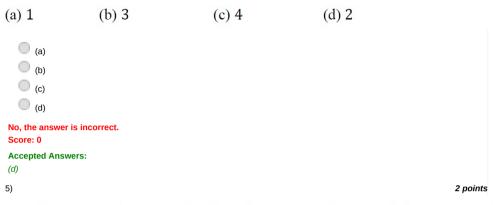
Introduction to Non-linear Optics and its Applica...

2 points



(c)
 (d)
 No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 (d)
 4)

The nonlinear polarization for Centrosymmetric molecule is  $P_{NL} = \varepsilon_0 \chi^{(3)} E^3$ . Co the electric field as  $E = E_0 \cos(\omega t)$ . The no of frequencies in the output will be



The change in refractive index ( $\Delta n$ ) due to cross phase modulation when a l with 1W power falls on a medium of cross-sectional area  $1mm^2$  ( $n_2 = 10^{-18}m^2/W$ )

(a) $6 \times 10^{-14}$	(b) $16 \times 10^{-12}$	(c) $12 \times 10^{-12}$	(d) $3 \times 10^{-13}$
(a) (b) (c) (d)			
No, the answer is incorrect. Score: 0			
Accepted Answers: (C)			
6)			2 points

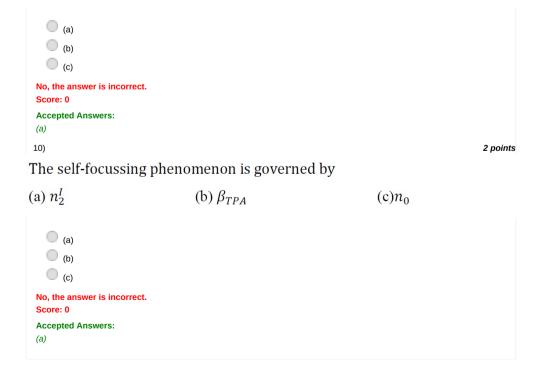
For centrosymmetric material (invariant under inversion) which of the followir correct (Hint: consider the transformation operation corresponding to a 45° rota about the z-axis)

(a) 
$$\chi_{xxxx}^{(3)} = \chi_{xxyy}^{(3)} + \chi_{xyyx}^{(3)} + \chi_{xyxy}^{(3)}$$
  
(b)  $\chi_{xxxx}^{(3)} = \chi_{xxyy}^{(3)} + \chi_{xyyx}^{(3)}$   
(c)  $\chi_{xxxx}^{(3)} = \chi_{xxyy}^{(3)} + \chi_{xyxy}^{(3)}$   
(a)  
(b)  
(c)  
No, the answer is incorrect.  
Score: 0  
Accepted Answers:

(a)  
7) **2** points  
If 
$$\chi^{(3)}$$
 is complex, then the nonlinear absorption coefficient  $\beta$  in terms of imag  
part of  $\chi^{(3)}$  is  
(a)  $\frac{3\omega}{2\epsilon_0 n^2 c^2} Im[\chi^{(3)}]$  (b)  $\frac{3\omega}{4\epsilon_0 n^2 c^2} Im[\chi^{(3)}]$  (c)  $\frac{3\omega}{\epsilon_0 n^2 c^2} Im[\chi^{(3)}]$   
(a)  
(a)  
(b)  
(c)  
No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
(a)  
8) **2** points  
Following from the Q7 the value of  $\beta$  for silicon at 1550 nm is  $(n = 3.5; Im[\chi^{1}]$   
 $3 \times 10^{-20} m^2/V^2)$   
(a)  $4.6 \times 10^{-12} m/W$  (b)  $6.6 \times 10^{-13} m/W$  (c)  $5.6 \times 10^{-12} m/I$   
(a)  
(b)  
(c)  
No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
(c)  
9) **2** points

Following from Q 8 if a light of intensity  $I_0 = 5 GW/cm^2$  incidents on a medium of length 1 m what will be the intensity at the output

(a)  $1.78 \times 10^{11} W/m^2$  (b)  $2.82 \times 10^{10} W/m^2$  (c)  $1.78 \times 10^{12} W/m^2$ 



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