

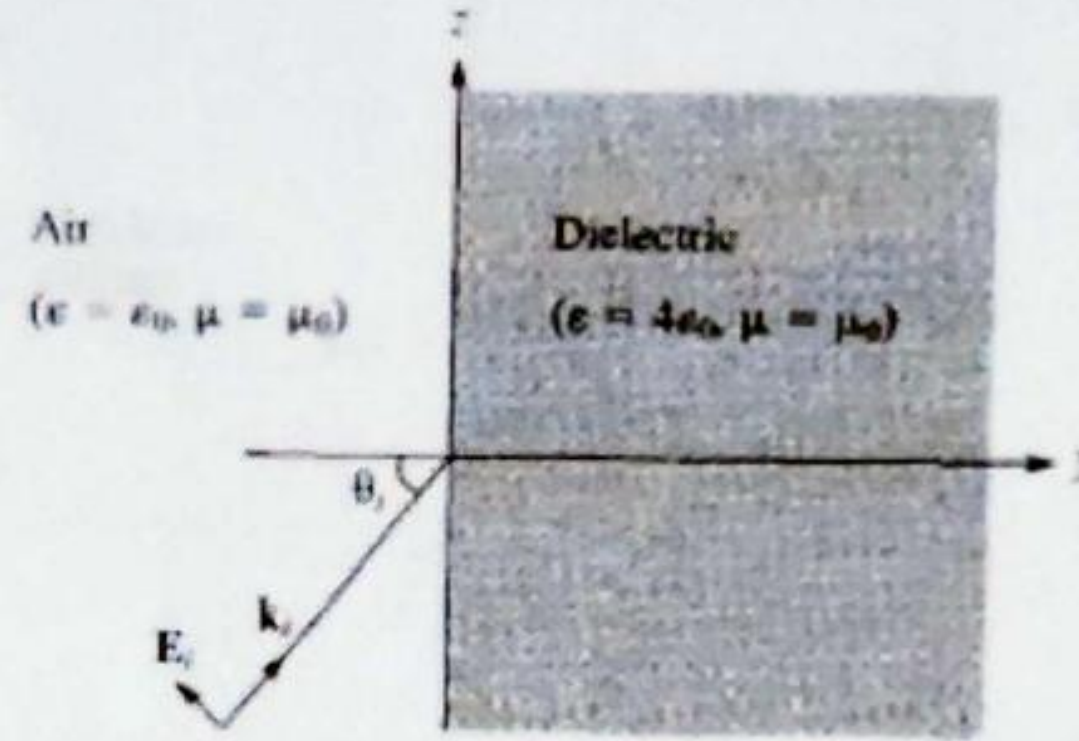


القسم: الاتصالات أسئلة الامتحان النهائي لمادة : كهرومغناطيسية 2
نظية الفصل: ..السادس رمز المادة: CM.3.22 التاريخ 2019-9-28
الفصل الدراسي : ربيع 2019 اسم الأستاذ : أ/جمعة عمارة ابوشعفة الزمن : ساعتان

اسم الطالب : رقم القيد : المجموعة :

Q1/ A parallel polarized wave in air with $E=(8a_x- 6a_y) \sin(\omega t-4y-3z) \text{ V/m}$

Impinges a dielectric half-space shown in figure. Find: 1- the incident angle θ_i
2- the time average in air ($\epsilon = \epsilon_0, \eta = \eta_0$) 3- the reflected and transmitted
E fields



Q2/ The plan wave $E=50 \sin(\omega t-5x)a_y \text{ V/m}$ in a lossless medium encounters a lossy medium ($\epsilon=4 \epsilon_0, \eta=\eta_0, \sigma=0.2 \text{ mhos/m}$) normal to the X-axis at $x=0$. Find 1- Γ, τ , and S 2- E_r and H_r 3- E_i and H_i 4- The time-average Poynting vectros in both regions

b- The plane wave $E_s= 300e^{-jkx} a_y \text{ V/m}$ is propagating in a material for which $\eta=2.5 \text{ } \mu\text{H/M}$, $\epsilon' = 7 \text{ PF/m}$, and $\epsilon'' = 7.8 \text{ PF/m}$. If $\omega = 64 \text{ Mrad/s}$, find: 1- α 2- β 3- v_p 4- λ 5- η 6- H_s 7- $E(3,2,4,10\text{ns})$.

Q3 A/ Consider a material for which $\eta_R= 1$, $\epsilon'_R=2.25$, and the loss tangent is 0.13. IF these three values are constant with frequency in the range $0.5 \text{ MHz} \leq f \leq 100 \text{ MHz}$.

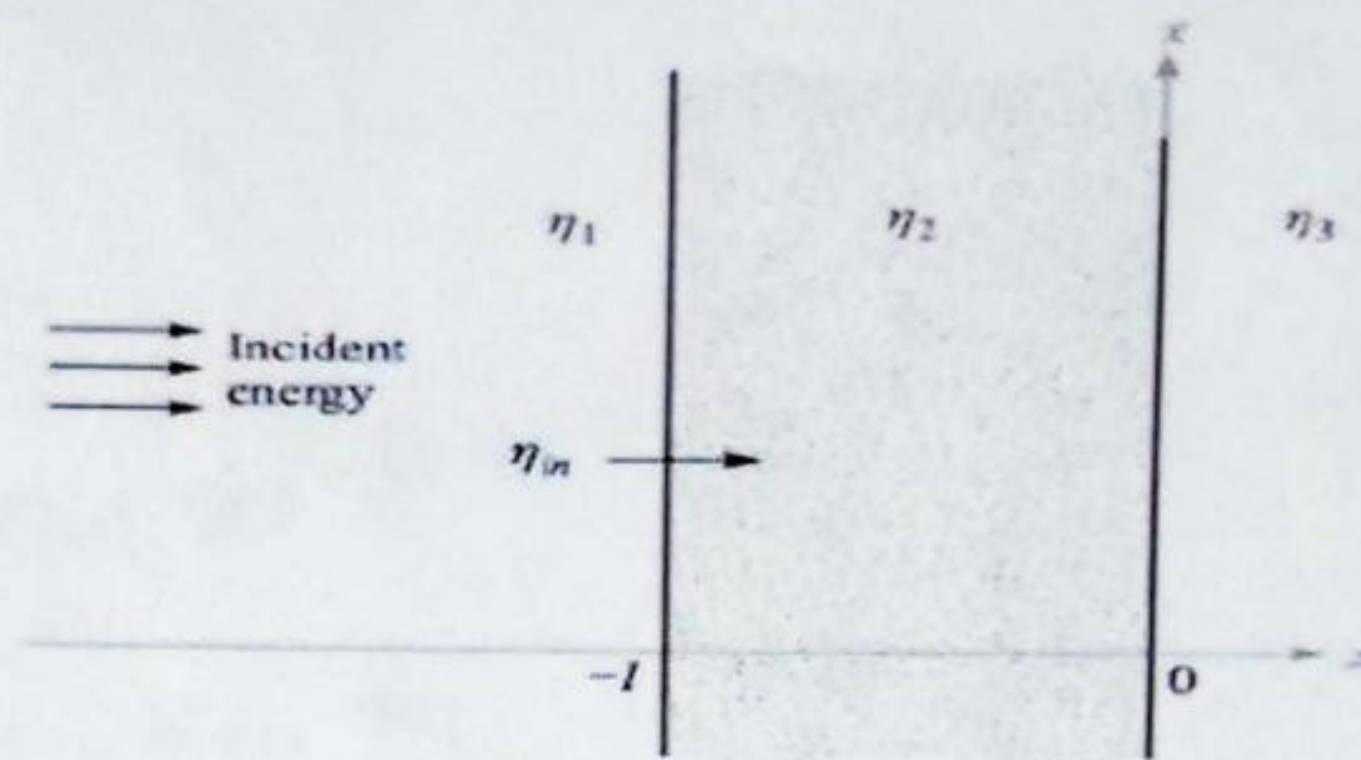
Calculate a- σ at 1 and 75 MHz b- λ at 1 and 75MHz c- v_p at 1 and 75MHz

b- Region 1, $z < 0$, and region 2, $z > 0$, are described by the following parameters: $\epsilon'_1 = 100 \text{ pF/m}$, $\epsilon''_1 = 0$, $\eta_1 = 35 \text{ } \mu\text{H/m}$, $\epsilon'_2 = 200 \text{ pF/m}$, $\eta_2 = 50 \text{ } \mu\text{H/m}$, and $\epsilon''_2 / \epsilon'_2 = 0.5$. If $E^+_1 = 600e^{-\alpha_1 z} \cos(5 \cdot 10^{10} t - \beta_1 z) a_x \text{ V/m}$, find 1- α_1 2- β_1
3- E^+_1 4- E^+_{s2} 5- E^-_{s1}



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Q4A/ Let $\eta_1 = \eta_3 = 377\Omega$, and $\eta_2 = 0.4\eta_1$. A uniform plane wave is normally incident from the left. As shown. Plot a curve of the standing wave ratio in region to the left 1- as function of L if $f = 2.25\text{GHz}$



B- Which of the following media may be treated as conducting at 10 MHz?

- 1- Wet marshy soil ($\epsilon = 15\epsilon_0$, $\mu = \mu_0$, $\sigma = 10^{-2} \text{ S/m}$)
- 2- Intrinsic germanium ($\epsilon = 16\epsilon_0$, $\mu = \mu_0$, $\sigma = 0.025 \text{ S/m}$)
- 3- Sea water ($\epsilon = 81\epsilon_0$, $\mu = \mu_0$, $\sigma = 25 \text{ S/m}$)