

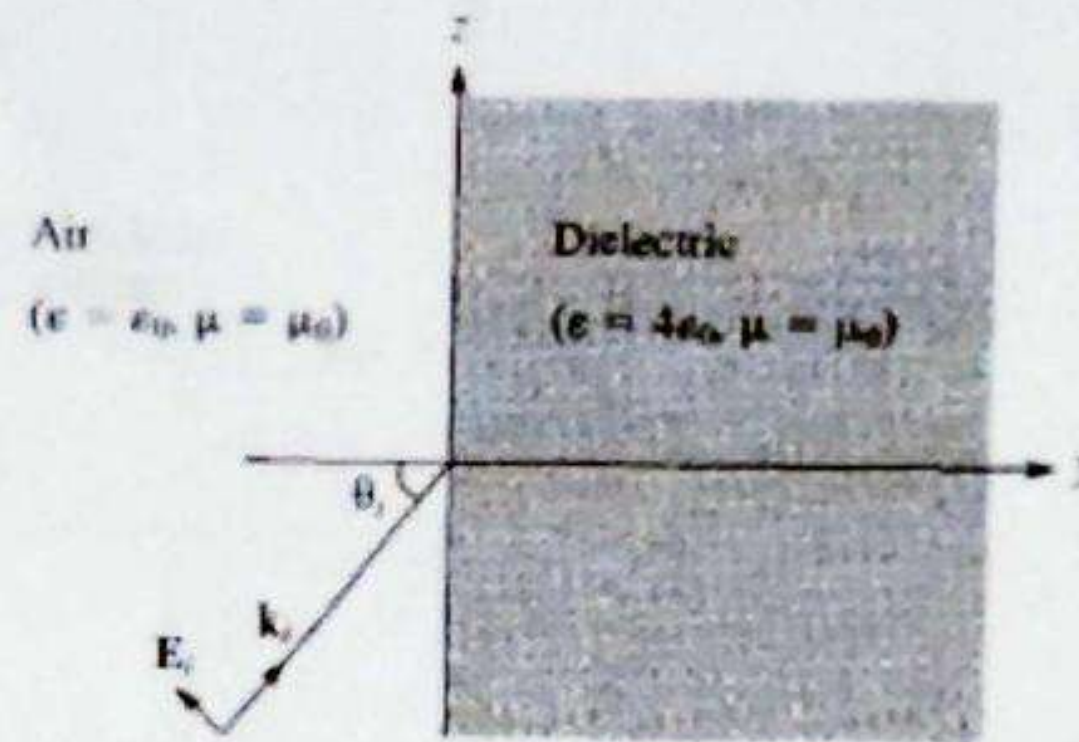


القسم: الاتصالات أسئلة الامتحان النهائي لمادة : كهرومغناطيسية 2  
نظية الفصل: ..السادس رمز المادة: CM.3.22 التاريخ 2019-9-28  
الفصل الدراسي : ربيع 2019 اسم الأستاذ : أ/جمعة عمارة ابوشعفة الزمن : ساعتان

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  $\theta_i$   
2- the time average in air ( $\epsilon = \epsilon_0, \mu = \mu_0$ ) 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 ( $\epsilon=4 \epsilon_0, \mu=\mu_0, \sigma=0.2 \text{ mhos/m}$ ) normal to the X-axis at  $x=0$ . Find 1-  $\Gamma, T$ , 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  $\mu=2.5 \mu_0, \epsilon' = 7 \text{ PF/m}$ , and  $\epsilon'' = 7.8 \text{ PF/m}$ . If  $\omega = 64 \text{ Mrad/s}$ , find: 1-  $\alpha$  2-  $\beta$  3-  $v_p$  4-  $\lambda$  5-  $\eta$  6-  $H_s$  7-  $E(3,2,4,10\text{ns})$ .

Q3 A/ Consider a material for which  $\mu_R= 1, \epsilon'_R=2.25$ , 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-  $\sigma$  at 1 and 75 MHz b-  $\lambda$  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:  $\epsilon'_1 = 100 \text{ pF/m}, \epsilon''_1 = 0, \mu_1 = 35 \mu_0, \epsilon'_2 = 200 \text{ pF/m}, \mu_2 = 50 \mu_0$ , 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-  $\alpha_1$  2-  $\beta_1$   
3-  $E^+_1$  4-  $E^+_{s2}$  5-  $E^-_{s1}$



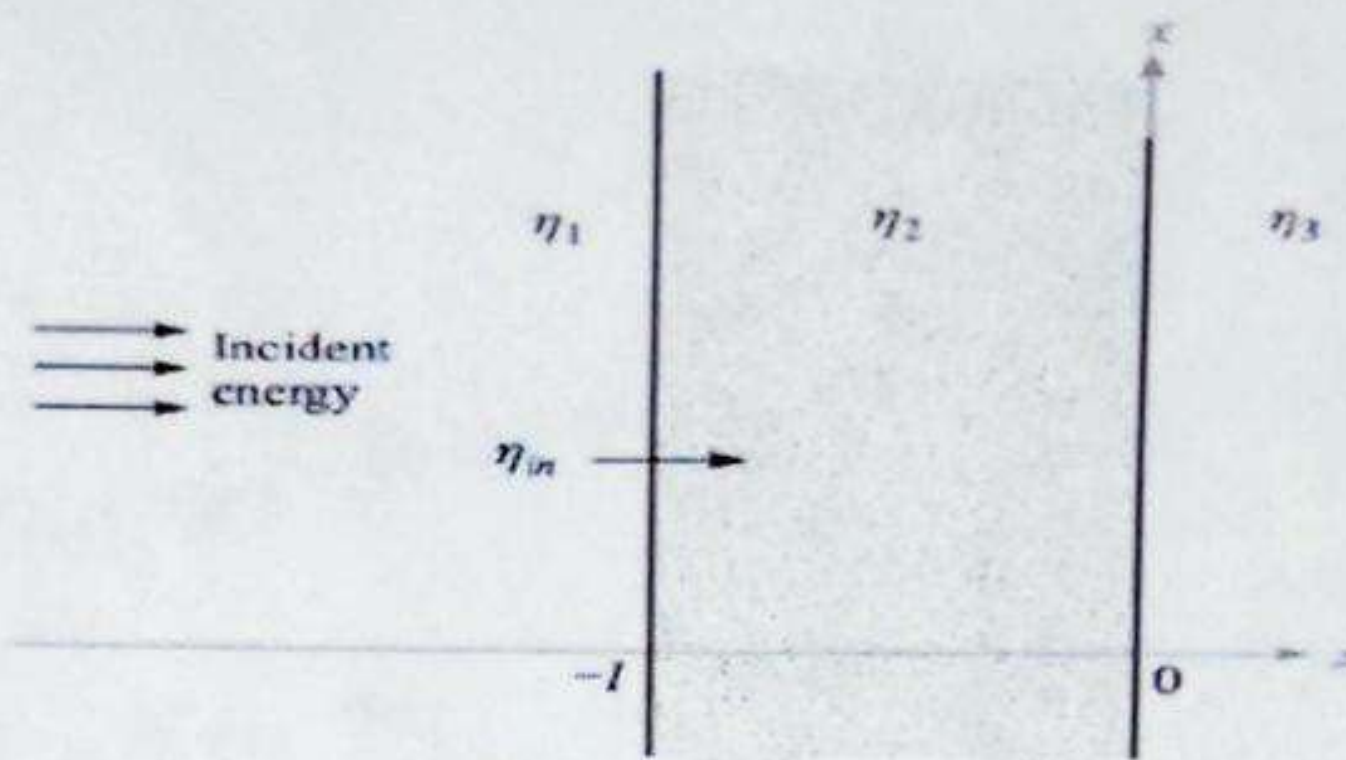


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طلبة الفصل: ..السادس  
الفصل الدراسي: ربيع 2019  
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أسئلة الامتحان النهائي لمادة: كهرومغناطيسية 2  
رمز المادة: C.M.322  
اسم الأستاذ: أ.جمعة عمارة ابوشعفة  
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الزمن: ساعتان  
رقم القيد: .....

المجموعة: .....

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 ( $\epsilon = 81\epsilon_0$ ,  $\mu = \mu_0$ ,  $\sigma = 25 \text{ S/m}$ )