كلية التقنية الالكترونية - طرابلس
College of Electronic Technology - Tripoli

قســـم: الاتصالات
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أسئلة الامتحان النهائي لمادة: الهوائيات
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اسم الأستاذ ضو على وداعة

أسم الطالب :................................. رقم القيد .... المجموعة : ....

أجب على أربعة أسئلة فقط

Q1) - Circular polarization directional Transmitted Antenna is operation at (28GHz) has Electric field(0.1kv/m) at far field region (2m) is incident on lossless linear polarization directional antenna has Max effective aperture (Area) ($2m^2$) and impedance antenna(70Ω) . it is connected with TL has impedance (50Ω) Find :

1- Power total of the transmitted antenna ?

2- Directivity of the received antenna (dB) ?

Q2) – Find the Electric field at distance (10km) from antenna has Gain (10dB) and radiating power (50kw)?

✓ **Q3-a)** - Transmission line has (50Ω) connected with half wave dipole antenna calculated the reflection Coefficient ?

✓ **Q3-b)** - The Reflection efficiency (75%) for ideal dipole antenna connected transmission line has $Z_0 = 50\Omega$ if gain (1.5w) with Power density ($0.5W/m^2$) **Find:**

1- Directivity at $[0 \leq \theta \leq \frac{\pi}{2}]$, $[0 \leq \emptyset \leq 2\pi]$?

2- Antenna impedance?

3- Total efficiency ?

Q4) - Design 19 Elements uniform for Scanning Array is working at (28GHz) has Max Array Factor (30°) with Spacing between element ($\frac{\lambda}{4}$) **Find :**

1- Initial Phase ?

2- Half Power Beam Width ?

Q5) – Design two Elements of the Yaqi antenna has Gain (17dB) at frequency 148MHz ?

ملاحظة على الأسئلة : (1) : الاجابة على السؤال الثالث إجبارية لجميع الطلبة
(2) : الطلبة الغائبين عن الامتحان النصفي النظري فقط الإجابة على جميع الأسئلة . أستاذ المادة . بالتوفيق للجميع

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قوانين مادة الهوائيات

$e_{ref} = 1 - |\Gamma|^2$,,,,,

$F(\theta,\emptyset) = \frac{|E|}{|E|_{max}}$,,,,,,,, $G = e_{rad} D$

$\Gamma = \frac{Z_{in}-Z_0}{Z_{in}+Z_0}$,,,,,,,,, $D = \frac{2Nd}{\lambda}$,,,,,, $D = \frac{4\pi}{\Omega_A}$,,,,, $L = [N-1]\, d$

$\Omega_A = \iint |F(\theta,\emptyset)|^2 \sin(\theta) d\theta\, d\emptyset$,,,,,,,, $R \geq \frac{2D^2}{\lambda}$

$e_T = e_{rad} * e_{ref}$,,,,,,,,,,,,,,,, $\alpha = -\beta \frac{d}{2} \cos\theta$,,,,,,,,, $\alpha = -\beta d \cos(\theta_0)$

$L_{eff} = L + 2\Delta L$,,,,,,,,,,, $\Delta L = 0.412 * h \left[\frac{(\varepsilon_{eff}+0.3)(\frac{W}{h}+0.264)}{(\varepsilon_{eff}-0.258)(\frac{W}{h}+0.8)}\right]$

$HPBW = \cos^{-1}\left[\cos(\theta_0) - 0.443\frac{\lambda}{L+d}\right] - \cos^{-1}\left[\cos(\theta_0) + 0.443\frac{\lambda}{L+d}\right]$

$W = \frac{C}{2F_0}\sqrt{\frac{2}{\varepsilon_r+1}}$,,,,,,,,,,,, $P_d = (\frac{P_T}{4\pi r^2})$

$$\varepsilon_{eff} = \frac{\varepsilon_r + 1}{2} + \left[\frac{\varepsilon_r - 1}{2}\right]\left[1 + 12\left[\frac{h}{W}\right]\right]^{-0.5}$$

$L = (0.47 \sim 0.49)\lambda$,,,,,,,, $L_R = (0.5 \sim 0.525)\lambda$,,,,,,, $L_D = (0.4 \sim 0.45)\lambda$,,,,,,, $S_{RD} = (0.2 \sim 0.25)\lambda$

$S_{DD} = (0.2 \sim 0.25)\lambda$,,,,,,,,,,,,,,,,,,,,,,,,, $S_D = (0.3 \sim 0.4)\lambda$

$H = \frac{E}{\eta}$,,,,,,,, $P_d = 0.5|E \times H^*|$

$Ae = \frac{\lambda^2}{4\pi} * Gr * Loss$,,,,, $P_r = \left(\frac{P_T}{4\pi r^2}\right) * G_T * Ae$,,,,,,,,, $D_0 = \frac{4\pi}{\Omega_A}$