Dany Silatcha Woussah

Professor Viviana

TCET 2220

Homework-Chap 6

6-1 d=5mm; V=200V

The electric field intensity is E$=\frac{V}{d}$

 E$=\frac{200}{0.005}$=40000 V/m

6-2 d=0.4 in =0.01016 m; V=60 V

E$=\frac{60}{0.01016}$=5905.51 V/m

6-3 d=0.04 m; E=2000 V/m

The voltage is V=E x d

V=2000 x 0.04 =80 V

6-4 d=0.008 m; E= 200 V/mm =0.2/m

The voltage is V=E x d

V=0.2 x 0.008 = 1.6 x 10-3 V

6-5 I=5 A; d=3m

The magnetic field is H$=\frac{I}{2πd}$ $=\frac{5}{2πx3}$ =265.258 x 10-3 A/m

6-6 5 I=40 mA; d=5 ft =1.524 m

The magnetic field is H$=\frac{I}{2πd}$ $=\frac{0.04}{2πx1.524}$ =4.188 x 10-3 A/m

6-7 E=2000 V/m; ϵr = 2.25

The electric flux density is D= ϵrE= 2.25 x 2000 =4500 C/m2

6-8 E=0.2 V/m; ϵ0= 8.842 x 10-12 F/m

The electric flux density is D= ϵrE= 8.842 x 10-12 x 0.2 = 1.769 x10-12 C/m2

6-9 H= 265.258 x 10-3 A/m; µ= µ0 = 4π x 10-7 H/m

The magnetic flux density is B=µH = 4π x 10-7 x 265.258 x 10-3 =333.333 x 10-9 Wb/m2

6-10 H= 4.188 x 10-3 A/m; µ= µ0 = 4π x 10-7 H/m

The magnetic flux density is B=µH = 4π x 10-7 x 4.188 x 10-3 =5.263 x 10-9 Wb/m2

6-11 A= 8 x 0.75 = 6 m2; D= 4 µC/m2=4 x 10-6 C/m2

ψ= 6 x (4 x 10-6) = 24 x 10-6 C/m2

6-12 A= π x(d/2)2 m2; D= 8 µC/m2=8 x 10-6 C/m2

ψ= π x (3/2)2 x 8 x 10-6  = 56.549 x 10-6 C/m2

6-13 r= 5 m ; B= 4 nWb/m2

A=πr2 = π x 52 =78.54 m φ= BA= 4 x 10-9 x 78.54 =314.16 nWb/m2

6-14 A= 0.3 x 0.6 = 180 mm ; B= 12 nWb/m2

 φ= BA= 12 x 10-9 x 180 x 10-3 =2.16 nWb/m2

6-15 I=8 A A= 5mm x 4mm = 20 x 10-6 m

 The current density is *J*$=\frac{I}{A}$=$\frac{8}{20 x 10-6 }$ =400 x 103 A/m2

6-16 A= π x(d/2)2 m2 d= 3 cm ; I = 4 A

The current density is *J*$=\frac{I}{A}$=$\frac{4}{π(0.03/2)2 }$ =1.415 x 103 A/m2

6-17 *E*$=\frac{J}{σ}$ = $\frac{400 x 103}{5 x 106}$ = 80 x 10-3 V/m

6-18 *E*$=\frac{J}{σ}$ = $\frac{1.415 x 103}{6 x 107}$ = 23.58 x 10-6 V/m

* 1. Hy = 200 µA/m ; ŋ0= 377
1. Ex =Hy x ŋ0 = 200 x 10-6 x 377 = 75.4 x 10-3 V/m
2. PZ = $\frac{Ex2}{ ŋ0}$=$\frac{(75.4 x 10-3)2}{377}$ = 15.08 x 10-6 W/m2
3. P= PZ x A =15.08 x 10-6 x π(25)2 = 29.61 W

6-20 ϵr= 80 ; EX = 3 V/m

1. ŋ=$\frac{ŋ0}{√ϵr}$ = $\frac{377}{\sqrt{80}}$ = 42.15 Ω

Hy =$\frac{Ex}{ŋ}$ =$\frac{3}{42.15} = 71.17$ x 10-3 A/m

For A= 15 x 15= 225 m2 , Hy =71.17 x 10-3 x 225 =16.01 A/m2

1. PZ= EXHy =3 x 71.17 x 10-3 =213.51 x 10-3 W/m
2. P=213.51 x 10-3 x 225 = 48.04 W/m2

6-21 EX = 50 mV/m ; Hy = 100 µA/m

1. ŋ=$\frac{Ex}{Hy}=\frac{50 x 10-3}{100 x 10-6}$ =500 Ω
2. PZ= EXHy = ( 50 x 10-3) x (100 x 10-6 ) =5 x 10-6 W/m2
3. ϵr = $\frac{\left(377\right)2}{ŋ2}$ =$\frac{\left(377\right)2}{\left(500\right)2}$ =568.52 x 10-3