قائمة الاسئلة

الاختبار النهائي للعام الجامعي 2025/2024م-كلية الهندسة :: انتشار موجات وهوائيات - كلية الهندسة - قسم الكهرباء اتصالات- المستوى الرابع -

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1) Which equations are regarded as wave equations in frequency domain for lossless media?
   1) - Maxwell's
   2) - Lorentz
   3) + Helmholtz
   4) - Poisson's
2) Sterdian is a measurement unit of ……..
   1) - Point angle
   2) - Linear angle
   3) - Plane angle
   4) + Solid angle
3) According to the geometry, how many sterdians are present in a full sphere?
   1) - $\pi/2$
   2) - π
   3) - 2π
   4) + 4π
4) The vector magnetic potential shows the inverse relationship with its ------
   1) - Source
   2) - Vector
   3) + Distance of point from the source (R)
   4) - Source & Vector
5) Which antenna radiating region/s has/have independent nature of angular field distribution over the distance from the antenna?
   1) - Reactive near-field region
   2) - Fresnel region
   3) + Fraunhofer region
   4) - All of the above
6) Under which conditions of two unit vectors, the polarization loss factor (PLF) is equal to unity?
   1) - Perpendicular
   2) + Perfectly aligned
   3) - Angle inclination (Ψp)
   4) - All of the above
7) **How are the infinitesimal dipoles represented in terms of antenna length and signal wavelength?**
   a) $l \leq (\lambda/50)$
   b) $(\lambda/50) < l \leq (\lambda/10)$
   c) $l = \lambda/2$
   d) **None of the above**

   1) + a
   2) - b
   3) - c
   4) - d
8) Which among the following defines the angular distance between two points on each side of major lobe especially when the radiation drops to zero?
   1) - Half power beam width (HPBW)
   2) + First null beam width (FNBW)

3) - Side lobe level (SLL)
4) - Front to back ratio (FBR)

9) If an observation point is closely located to the source, then the field is termed as ……
1) + Induced
2) - Radiated
3) - Reflected
4) - Far-field

10) Which pattern is generated due to plotting of square of amplitude of an electric field?
1) - Field Pattern
2) - Voltage Pattern
3) + Power Pattern
4) - All of the above

11) On which factor/s do/does the radiation field of a small loop depend?
1) - Shape
2) + Area
3) - Shape & Area
4) - None of the above

12) From the radiation point of view, small loops are …… radiators.
1) + Poor
2) - Good
3) - Better
4) - Excellent

13) Which type of ground wave travels over the earth surface by acquiring direct path through air from transmitting to receiving antennas?
1) - Surface wave
2) + Space wave
3) - Surface wave & Space wave
4) - None of the above

14) What is /are the advantages of using ferrite loops?
1) - Increase in Magnetic field intensity
2) - Increase in radiation resistance
3) - Decrease in Magnetic field intensity
4) - Decrease in radiation resistance
5) + Increase in Magnetic field intensity & Increase in radiation resistance

15) **According to the directivity of a small loop, which value of 'θ' contributes to achieve the maximum value of radiation intensity (U_{max})?**
a) 0°
b) 90°
c) 180°
d) 270°

1) - a
2) + b
3) - c
4) - d

16) Under which conditions of charge does the radiation occur through wire antenna?
1) - For a charge with no motion
2) - For a charge moving with uniform velocity with straight & infinite wire
3) + For a charge oscillating in time motion

4) - All of the above

17) The radiation intensity of a given antenna is given by U = 4 sin(φ), where $0 \le \theta \le \pi$ and $0 \le \varphi \le \pi$. Find the exact directivity?
1) + 3.14
2) - 3.55
3) - 2.78
4) - 3.67

18) The radiation intensity of a given antenna is given by U = 4 sin(φ), where $0 \le \theta \le \pi$ and $0 \le \varphi \le \pi$. Find the directivity using Kraus' approximate method.
1) - 3.14
2) + 2.86
3) - 2.57
4) - 1.23

19) **If a half-wave dipole operates at 300 MHz with $\lambda = 0.5$m & $D_o = 1.643$, what will be its effective area?**
a) $0.032\ m^2$
b) $0.047\ m^2$
c) $0.65\ m^2$
d) $0.99\ m^2$

1) + a
2) - b
3) - c
4) - d

20) **If the magnetic field component of a plane wave in a lossless dielectric is $= 50\ sin\ (2\pi\ x10^6\ t - 6x)\ a_z\ mA/m$, what will be the wave velocity?**
a) $1.047\ x10^6$ m/s
b) $1.257\ x10^6$ m/s
c) $2.5\ x10^6$ m/s
d) $3\ x10^6$ m/s

1) + a
2) - b
3) - c
4) - d

21) **The approximate far zone normalized electric field radiated by a resonant linear dipole antenna is given by $E_a = \vec{a}_\theta\, E_a sin(\theta)\, \frac{e^{-jkr}}{r}$, where $0 \le \theta \le \pi$ and $0 \le \varphi \le 2\pi$. Find the directivity using Tai and Pereira's approximate method.**

1) - 3.75
2) - 4
3) + 4.495
4) - 5'.93

22) A receiving antenna with a 20 dB gain is located at a distance of 0.5 km over a free-space 1 GHz circuit consisting of a transmitting lossless isotropic antenna with a 25 dB gain. The transmitting antenna input is 150 W. What is the max effective area of the transmitting antenna?
1) - 0.679

2) - 1.13
3) + 2.263
4) - 4.526

23) _A receiving antenna with a 20 dB gain is located at a distance of 0.5 km over a free-space 1 GHz circuit consisting of a transmitting lossless isotropic antenna with a 25 dB gain. The transmitting antenna input is 150 W. What is the max effective area of the receiving antenna?

1) + 0.716
2) - 1.432
3) - 0.215
4) - 0.358

24) __A receiving antenna with a 20 dB gain is located at a distance of 0.5 km over a free-space 1 GHz circuit consisting of a transmitting lossless isotropic antenna with a 25 dB gain. The transmitting antenna input is 150 W. What is the maximum received power?

1) - 2.7 mW
2) - 43.2 mW
3) - 0.97 mW
4) + 10.81 mW

25) **Fig.1 shows the circuit of a small dipole of length $l = \lambda/20$ and of wire radius a = λ/500, which fed symmetrically, and it is used as a communications antenna at the lower end of the VHF band ($f = 50\ MHz$). The antenna is made of perfect electric conductor. Determine the radiation resistance.**

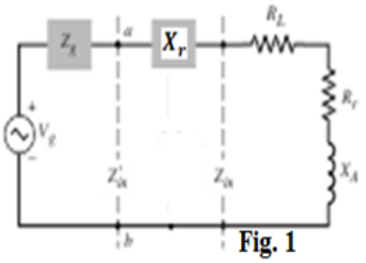

Fig. 1

1) + 0.493 Ω
2) - 0.247 Ω
3) - 1.974 Ω
4) - 0.628 Ω

26) **Fig.1 shows the circuit of a small dipole of length $l = \lambda/20$ and of wire radius a = λ/500, which fed symmetrically, and it is used as a communications antenna at the lower end of the VHF band ($f = 50\ MHz$). The antenna is made of perfect electric conductor. The input reactance is given by**

$$X_{in} = -j120\frac{[ln\left(\frac{l}{2a}\right) - 1]}{tan(\frac{\pi l}{\lambda})}$$

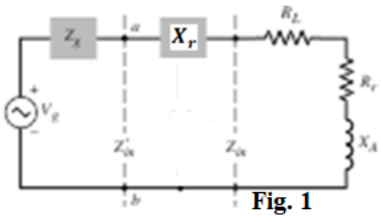

Fig. 1

Find the input impedance of the antenna?

1) - 0.628-j1681 Ω
2) - 1.974-j1681 Ω
3) + 0.493-j1681 Ω
4) - 0.543-j1681 Ω

27)

Fig.1 shows the circuit of a small dipole of length $l = \lambda/20$ and of wire radius a = λ/500, which fed symmetrically, and it is used as a communications antenna at the lower end of the VHF band ($f = 50\ MHz$). The antenna is made of perfect electric conductor. Find the radiation efficiency.

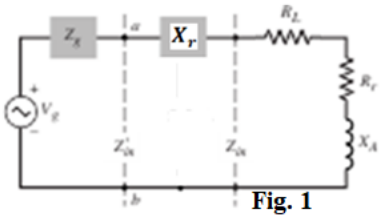

Fig. 1

1) \+ 100%
2) \- 43.2%
3) \- 81.3%
4) \- 71.65%

28) **Fig.1 shows the circuit of a small dipole of length $l = \lambda/20$ and of wire radius a = λ/500, which fed symmetrically, and it is used as a communications antenna at the lower end of the VHF band ($f = 50\ MHz$). The antenna is made of perfect electric conductor. Find the capacitor or inductor that must be connected in series with the dipole at the feed in order to resonate the element.**

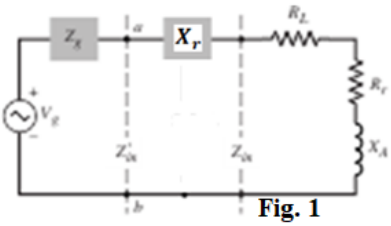

Fig. 1

1) \- 5.35 nF.
2) \+ 5.35 µH.
3) \- 1.681 nH.
4) \- 1.681 pF.

29) If the radius of loop is λ/ 20 in a free space medium, what will be the radiation resistance of 8-turn small circular loop?

1) \- 0.7883 Ω
2) \- 50.45 Ω
3) \+ 123.17 Ω
4) \- 190.01 Ω

30) **A resonant six-turn circular loop is operating at 100 MHz. The loop radius is λ/25, and the loop is connected to a 50 Ω transmission line. The wire radius is λ/500, its conductivity is 5.7×10^7 S/m, and the spacing between the turns is λ/100. Assuming the antenna is radiating into free-spaces. Determine the radiation efficiency**
(Hint: $\frac{R_p}{R_o} = 0.4$).

1) \- 91.93%
2) \- 85.2%
3) \- 92.58%
4) \+ 98.46%

31) **A resonant six-turn circular loop is operating at 100 MHz. The loop radius is λ/25, and the loop is connected to a 50 Ω transmission line. The wire radius is λ/500, its conductivity is 5.7×10^7 S/m, and the spacing between the turns is λ/100. Assuming the antenna is radiating into free-spaces. Determine the maximum effective aperture.**
a) $1.5\ m^2$
b) $2.142\ m^2$
c) $1.071\ m^2$
d) $0.978\ m^2$

1) \- a
2) \- b

3) + c
4) - d

32) **A certain lossless material has $\mu_r = 1.44$ and $\varepsilon_r = 6.25$. A 100-MHz uniform plane wave is propagating in the $\vec{a}_y$ direction and expressed as $E_s = (30 - j20)\, e^{-j\beta y}\, \vec{a}_x \quad V/m$. Find the phase constant (β)**

1) - 1.26 rad/s
2) + 2π rad/s
3) - 4π rad/s
4) - 2.095 rad/s

33) **A certain lossless material has $\mu_r = 1.44$ and $\varepsilon_r = 6.25$. A 100-MHz uniform plane wave is propagating in the $\vec{a}_y$ direction and expressed as $E_s = (30 - j20)\, e^{-j\beta y}\, \vec{a}_x \quad V/m$. Find the wavelength ($\lambda$).**

1) - 0.204 m
2) - 0.5 m
3) - 0.304 m
4) + 1 m

34) **A certain lossless material has $\mu_r = 1.44$ and $\varepsilon_r = 6.25$. A 100-MHz uniform plane wave is propagating in the $\vec{a}_y$ direction and expressed as $E_s = (30 - j20)\, e^{-j\beta y}\, \vec{a}_x \quad V/m$. Find the propagation velocity (v_p).**
a) $1.5 \times 10^8 m/s$
b) $10^8 m/s$
c) $3 \times 10^8 m/s$
d) $1.2 \times 10^8 m/s$

1) - a
2) + b
3) - c
4) - d

35) **A certain lossless material has $\mu_r = 1.44$ and $\varepsilon_r = 6.25$. A 100-MHz uniform plane wave is propagating in the $\vec{a}_y$ direction and expressed as $E_s = (30 - j20)\, e^{-j\beta y}\, \vec{a}_x \quad V/m$. Find the intrinsic impedance (η).**

1) + 181 Ω
2) - 377 Ω
3) - 362 Ω
4) - 150.8 Ω

36) **A certain lossless material has $\mu_r = 1.44$ and $\varepsilon_r = 6.25$. A 100-MHz uniform plane wave is propagating in the $\vec{a}_y$ direction and expressed as $E_s = (30 - j20)\, e^{-j\beta y}\, \vec{a}_x \quad V/m$. Find the magnetic field $H(y,t)$ at $P(0.3, 0.6, 0.8)$ and $t = 60\ ns$.**
a) $-1.57\vec{a}_z$ A/m
b) $-0.785\vec{a}_z$ A/m
c) $69.14\, \vec{a}_z \frac{A}{m}$
d) $-69.14\, \vec{a}_z\, mA/m$

1) - a
2) - b
3) - c
4) + d

37) Determine the length of a monopole whose input resistance is 60 ohms.
1) - 0.422λ
2) - 0.4539λ
3) + 0.2995λ

4) - 0.278λ

38) **A half-wavelength ($l = \lambda/2$) dipole is connected to a transmission line with a characteristic impedance of 75 ohms. Determine the reflection coefficient.**
a) $\Gamma = -0.0135 \Rightarrow |\Gamma| = 0.0135, \phi = 180^o$
b) $\Gamma = 0.2763\angle 76.674^o \Rightarrow |\Gamma| = 0.2763, \phi = 76.674^o$
c) $\Gamma = 0.4763\angle 56.6^o \Rightarrow |\Gamma| = 0.4763, \phi = 56.6^o$
d) $\Gamma = 0.4763\angle -56.6^o \Rightarrow |\Gamma| = 0.4763, \phi = -56.6^o$

1) - a
2) + b
3) - c
4) - d

39) A half-wavelength (l =λ/2) dipole is connected to a transmission line which achieve a reflection coefficient (0.2737 + j0.2510). Determine the voltage standing wave ratio (VSWR.).
1) - VSWR = 4.33
2) + VSWR = 2.1814
3) - VSWR = 1.46 + j0.85
4) - VSWR = 2.47 + j1.23

40) **A circular loop is operating at 10 MHz. The loop radius is λ/30, and the wire radius is λ/1000 with conductivity of 5.7×10^7 S/m. Assuming the antenna is radiating into free-spaces. Determine the lossless resistance of the loop.**
a) $R_L = 0.545\ \Omega$
b) $R_L = 0.778\ \Omega$
c) $R_L = 0.2774\ \Omega$
d) $R_L = 0.02774\ \Omega$

1) - a
2) - b
3) - c
4) + d