

## PHYSICS

## **BOOKS - A2Z PHYSICS (HINGLISH)**

## ELECTROMAGNETIC WAVES AND COMMUNICATION SYSTEM

**Electromagnetic Waves** 

**1.** Speed of light in vacuum is  $3 \times 10^8 m/s$ . Range of wavelength of visible light is  $4000\text{\AA} - 7000\text{\AA}$ . Find the range of frequency of visible light.

A.  $10^{15}Hz$ 

 $\mathsf{B.}\,10^{10}Hz$ 

 $\mathsf{C}.\,10^6Hz$ 

D.  $10^4 Hz$ 

Answer: a



**2.** X-rays are produced by jumping of:

A. electrons from lower to higher energy will of

atom

B. electrons from higher lower energy orbit of atom

C. proton from lower to higher energy orbit of

nuclenus

D. proton from higher to lower energy orbit of

nucleus

Answer: b

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**3.** Which of the following wavelenght falls in *X*-rays region?

**A**. 1Å

B. 10Å

 $C. 10^{-2}$ Å

D.  $10^{-3}$ Å

Answer: a

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**4.** The percentage power of X-ray increases with the increases in its:

A. velocity

B. intensity

C. frequency

D. wavelength



A.  $10 \text{\AA}$  to  $100 \text{\AA}$ 

B. 4, 000Å to 8, 000Å  $\,$ 

C. 8, 000Å to 10, 000Å  $\,$ 

D. 10, 000Å to 15, 000Å

Answer: B



6. Which radiation in sunlight causes heating effect?

A. Ultraviolet

**B.** Infrared

C. Visible light

D. All of these

Answer: B



7. The speed of electromagnetic wave in vacuum

A. Increases as we move from  $\gamma$ -rays to radio waves

B. Decreases as move from  $\gamma$ -rays to radio waves

C. Is same for all of them

D. None of these

Answer: C



**8.** Which of the following radiation has the least wavelength?

A.  $\gamma$ -rays

B.  $\beta$ -rays

C.  $\alpha$ -rays

 $\mathsf{D}.\,X\text{-}\mathsf{rays}$ 

#### Answer: A



**9.** The maximum distance upto which TV transmission from a TV tower of height h can be received is proportional to

A.  $h^{1/2}$ 

 $\mathsf{B}.\,h$ 

 $\mathsf{C}.\,h$ 

D.  $h^2$ 

# Answer: a Watch Video Solution

**10.** Which of the following are not electromagnetic waves ?

A. Cosmic rays

B. Gamma rays

 $\mathsf{C.}\,\beta-rays$ 

D. X-rays

Answer: C

11. The electromagnetic wave travel with a velocity

A. Equal to velocity of sound

B. Equal to velocity of light

C. Lets than velocity of light

D. None of these

#### Answer: B



**12.** The ozone layer absorbs

- A. Infrared radiations
- **B.** Utraviolet radiations
- $\mathsf{C}.\,X\text{-}\mathsf{rays}$
- D.  $\gamma$ -rays

#### Answer: B



### 13. Electromagnetic radiation of highest frequency is

A. Infrared radiations

**B. Visible radiation** 

C. Radio waves

D.  $\gamma$ -rays

#### Answer: D

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**14.** Which of the following waves have the maximum wavelength?

A. X-rays

B. I.R. rays

C. UV rays

D. Radio waves



**15.** Electrimagnetic waves are transverse is nature is evident by

A. Polarization

**B.** Interference

C. Reflection

D. Diffraction

Answer: a



**16.** If E and B represent electric and magnetic field vectors of the electromagnetic wave, the direction of propagation of electromagnetic wave is along.

A. 
$$\overrightarrow{E}$$

 $\mathsf{B}.\, \overset{\prime}{B}$ 

$$\mathsf{C}.\overrightarrow{E}\times\overrightarrow{B}$$

D. None of these

Answer: c

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**17.** The frequencies of X-rays,  $\gamma$ -rays and ultraviolet rays

are respectively a, b and c. Then

A. 
$$a < b, b > c$$
  
B.  $a > b, b > c$   
C.  $a > b, b < c$ 

 $\mathsf{D}.\, a < b, b < c$ 

#### Answer: a



18. Radio waves and visible light in vacuum have

A. Same velocity but different wavelength

- B. Continuous emission spectrum
- C. Band absorption spectrum
- D. Line emission spectrum

Answer: A



19. The shorted wavelength of X- rays emitted from an

X-rays tube depends on

A. nuture of the gas in the tube

B. voltage applied to tube

C. current in the tube

D. nature of target of the tube.

#### Answer: b



**20.** *X*-rays are not used for radar purooses, because they are not,

A. reflected by trget

B. partly absorbed by target

C. electromagnetic waves

D. completely absorbed by target.



**21.** The energy of X-rays photon is  $3.3 \times 10^{-16}$  J.lts frequency is:

- A.  $2 imes 10^{19} Hz$
- B.  $5 imes 10^{18} Hz$
- ${\sf C}.\,5 imes 10^{17} Hz$
- D.  $5 imes 10^{16} Hz$

Answer: c

#### 22. The wavelength of ultraviolet rays is of the order of:

A.  $10^{-3}$ 

- B.  $10^{-6}m$
- $C. 10^{-8} m$
- D. between (b) and (c).

#### Answer: d



23. The wavelength of infrared rays is of the order of:

- A.  $5 imes 10^{-7}m$
- $B.\,10^{-3}m$
- C. between (a) and (b)
- D. None of these

#### Answer: c



**24.** The minimum frequency  $v_{\min}$  of continuous X-rays

is related to the applied pot. Diff V as:

- A.  $V_{
  m min} \propto V$
- B.  $V_{
  m min} \propto V^{1/2}$

- C.  $V_{
  m min} \propto V^{1/3}$
- D.  $V_{
  m min} \propto V^4$

#### Answer: a

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**25.** In an electromagnetic wave, the average energy density associated with magnetic field is:

A.  $Li_0^2/2$ 

B.  $B^2/2\mu_0$ 

C.  $\mu_0 B^2/2$ 

D.  $\mu_0/2B^2$ 

## Answer: b Watch Video Solution

**26.** An electromagnetic wave going through vacuum is described by

 $E=E_0\sin(kx-\omega t).$  Which of the following is/are

independent of the wavelength?

A. K

 $\mathrm{B.}\,\omega^2$ 

C.  $k/\omega$ 

D.  $k\omega^2$ 



**27.** Displacement current goes through the gap between the plates of a capacitor when the charge of the capacitor

A. increases of decrease

B. Only decrease

C. dose not change

D. is zero.

Answer: a



28. Speed of electromagnetic waves is the same

A. for all wavelength

B. in all media

C. for all intenjsities

D. for all frequencies.

Answer: c



29. Which of the following have zero average value in a

plane electromagnetic wave?

A. electric field

B. magnetic potential

C. electric energy

D. magnetic energy.

Answer: a



**30.** Light wave is travelling along *y*-direction. If the corresponding  $\overrightarrow{E}$  vector at any time is along the *x*-axis, the direction of  $\overrightarrow{B}$  vector at that time is along



A. y-axis

B. *x*-axis

C. + z-axis

D. - zaxis

#### Answer: D

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**31.** What is ozone hole?

A. Hole in the ozone layer

B. Formation of ozone layer

C. Thinning of ozone layer in troposphere

D. Reduction in ozone thickness in stratosphere

#### Answer: d





**32.** Light is an electromagnetic wave. Its speed in vacuum is given by the expression

A. 
$$\sqrt{\mu_0 \varepsilon_0}$$
  
B.  $\frac{\sqrt{\mu_0}}{\varepsilon_0}$   
C.  $\frac{\sqrt{\varepsilon_0}}{\mu_0}$   
D.  $\frac{1}{\sqrt{\mu_0 \varepsilon_0}}$ 

#### Answer: D



**33.** If a source is transmitting electric wave of frequency  $8.2 imes 10^6$  Hz, then wavelength of the electromagnetic waves transmitted from the source will be

A. 36.6m

 $\mathsf{B.}\,40.5m$ 

 $\mathsf{C.}\,42.3m$ 

 $\mathsf{D.}\,50.9m$ 

**Answer: A** 



**34.** In an apparatus the electric field was found to oscillate with an amplitude of 18 V/M. The magnitude of the oscillating magnetic field will be

- A.  $4 imes 10^{-6}T$
- B.  $6 imes 10^{-8}T$
- C.  $9 imes 10^{-9}T$
- D.  $11 imes 10^{-11} T$

Answer: B



**35.** According to Maxwell's hypothesis, a changing electrio field gives rise to

A. An e. m. f

B. Electric current

C. Magnetic field

D. Pressure radiant

Answer: C



**36.** The oscillating electric and magnetic vectors of an electromagnetic wave are oriented along

A. The same direction but differ in phase by  $90^{\,\circ}$ 

B. The same direction and are in phase

C. Mutually perpendicular direction and are in

phase

D. Mutually perpendicular and differ in phase by  $90^{\circ}$ 

Answer: c



**37.** In which one of the following regions of the electromagnetic spectrum will the vibrational motion of molecules give rise to absorption?

A. Ultraviolet

**B.** Microwaves

C. Infrared

D. Radio waves

**Answer: B** 



**38.** An electromagnetic wave travel along *z*-axis. Which of the following pair of space and time varying fields would generate such a wave?

A.  $E_x, B_y$ B.  $E_y, B_x$ 

- $\mathsf{C}.\, E_z,\, B_x$
- D.  $E_y, B_z$

Answer: A



**39.** Which of the following rays has the maximum frequency?

A. Gamma rays

B. Blue light

C. Infrared rays

D. Ultraviolet rays

Answer: a



**40.** A signal emitted by an antenna from a certain point can be received at another point of the surface in the form of

A. Sky wave

B. Ground wave

C. Sea wave

D. Both (a) and (b)

Answer: d


41. The electromagnetic waves do not transport

A. Energy

B. Charge

C. Momentum

D. Information

Answer: b



**42.** A plane electromagnetic wave is incident on a material surface. The wave delivers momentum p and

energy E.

A. 
$$p = 0, E = 0$$

B. 
$$p 
eq 0, E 
eq 0$$

C. 
$$p 
eq 0, E 
eq 0$$

D. p=0, E 
eq 0

### Answer: b



43. An electromagnetic wave going through vacuum is

described by

 $E=E_0\sin(kx-\omega t).$  Which of the following is/are

# independent of the wavelength?

A. k

 $\mathsf{B.}\,\omega$ 

C.  $k/\omega$ 

D.  $k\omega$ 

# Answer: C

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44. An electromagnetic wave going through vacuum is

described by

 $E=E_0\sin(kx-\omega t), B=B_0\sin(kx-\omega t).$ 

Then

A. 
$$E_0 k = B_0 \omega$$

B. 
$$E_0\omega=B_0k$$

 $\mathsf{C}.\, E_0B_0=\omega k$ 

D. `None of these

## Answer: A



**45.** An LC resonant circuit a 400pF capacitor and a  $100\mu H$  inductor. It is set into oscillation coupled to an

antenna. The wavelength of the radiated

electromagnetic wave is

A. 377mm

 $\mathsf{B.}\,377m$ 

C. 377cm

 $\mathsf{D}.\,3.77cm$ 

**Answer: B** 

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**46.** A radio receiver antenna that is 2m long is oriented along the direction of the electromagnetic wave and

receives a signal of intensity  $5 imes 10^{-16}W/m^2$ . The maximum instaneous potential difference across the two ends of the antenna is

A.  $1.23 \mu V$ 

 $\mathsf{B}.\,1.23mV$ 

 $\mathsf{C}.\,1.23V$ 

 $\mathsf{D}.\,12.3mV$ 

Answer: a



**47.** A TV tower has a height of 100m. The average population density around the tower is  $1000perkm^2$ . The radius of the earth is  $6.4 \times 10^6m$ . The population covered by the tower is

A.  $2 imes 10^6$ B.  $3 imes 10^6$ C.  $4 imes 10^6$ 

D.  $6 \times 10^{6}$ 

#### Answer: c



48. Radiations of intensity  $0.5 W/m^2$  are striking a

metal plate. The pressure on the plate is

A. 
$$0.166 imes 10^{-8}N/m^2$$

B.  $0.33 imes 10^{-8}N/m^2$ 

C.  $0.111 imes 10^{-8}N/m^2$ 

D. 
$$0.083 imes 10^{-8}N/m^2$$

### **Answer: A**

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**49.** Electromagnetic waves travel in a medium which has relative permeability 1.3 and relative permittivity

2.14. Then the speed of the electromagnetic wave in

the medium will be

A.  $1.36 imes 10^6 m\,/\,s$ 

B.  $1.8 imes 10^2 m\,/\,s$ 

C.  $3.6 imes10^8m/s$ 

D.  $1.8 imes10^8m/s$ 

### Answer: D

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**50.** The intensity of gamma radiation from a given source is I

On passing through 36mm of lead , it is reduced to  $\frac{1}{8}$  . The thickness of lead which will reduce the intensity to  $\frac{1}{2}$  will be

A. 18mm

 $\mathsf{B.}\,12mm$ 

 $\mathsf{C.}\,6mm$ 

D. 9mm

Answer: B



**51.** If c is the speed of electromagnetic waves in vacuum, its speed in a medium of dielectric K and relative permeability  $\mu_r$  is

A. 
$$v=rac{1}{\sqrt{\mu_r K}}$$
  
B.  $v=c\sqrt{\mu_r K}$   
C.  $v=rac{c}{\sqrt{\mu_r K}}$   
D.  $v=rac{K}{\sqrt{\mu_r C}}$ 

### Answer: c



**52.** A parallel plate capacitor of plate separation 2mm is connected in an electric circuit having source voltage 400V. If the plate area is  $60cm^2$ , then the value of displacement current for  $10^{-6}$  sec will be

A. 1.062amp

B.  $1.062 imes 10^{-2} amp$ 

C.  $1.062 imes 10^{-3} amp$ 

D.  $1.062 imes 10^{-4} amp$ 

### **Answer: B**



**53.** A long straigth wire of resistance R, radius a and length l carries a constant current I. The poynting vector for the wire will be

A. 
$$\frac{IR}{2\pi al}$$
  
B. 
$$I\frac{R^2}{al}$$
  
C. 
$$\frac{I^2R}{al}$$
  
D. 
$$\frac{I^2R}{2\pi al}$$

# Answer: d



54. In an electromagnetic wave, the amplitude of electric field is  $1\frac{V}{m}$ . The frequency of wave is  $5 \times 10^{14} Hz$ . The wave is propagating along *z*-axis. The average energy density of electric field, in joule  $/m^3$ , will be

A.  $1.1 imes 10^{-11}$ B.  $2.2 imes 10^{-12}$ C.  $3.3 imes 10^{13}$ 

D. 4.4 imes 10  $^{-44}$ 

# Answer: B

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55. A laser beam can be focussed on an area equal to the square of its wavelength A He - Ne laser radiates energy at the rate of focussed beam will be

A.  $1.5 imes 10^{13} W/m^2$ 

B.  $2.5 imes 10^9 W/m^2$ 

C.  $3.5 imes 10^{17} W/m^2$ 

D. None of these

Answer: b



**56.** A lamp emits monochromatic green light uniformly in all directions. The lamp is 3% efficient in converting electrical power to electromagnetic waves and consumes 100W of power. The amplitude of the electric field associated with the electromagnetic. radiation at a distance of 10m from the lamp will be

A. 1.34V/m

B. 2.68V/m

 ${
m C.}\,5.36V/m$ 

D. 9.37V/m

Answer: A



**57.** A parallel- plate capacitor with plate area A and separation between the plates d, is charged by a constant current i. Consider a plane surface of area A/2 parallel to the plates and drawn summetrically between the plates. Find the displacement current through this area.

A. i

B. 
$$\frac{i}{2}$$
  
C.  $\frac{i}{4}$ 

D. None of these

Answer: b



**58.** An electromagnetic wave of frequency v = 3.0 MHzpasses from vacuum into a dielectric medium with permittivity  $\varepsilon = 4.0$ . Then

A. Wavelength is double and frequency become half

B. Wavelength is double and frequency becomes

half

C. Wavelength is halved and frequency remains unchanged

D. wavelengthand frequency remain unchanged

# Answer: c



**59.** In X-rays tube the accelerating potential at the anode is V volt, The minimum wavelength of the emitted X-rays will be.

A. eV/h

B. h/eV0

C. eV/ch

 $\mathrm{D.}\,hc/eV.$ 

Answer: d





## Answer: A

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**61.** In a place *e*. *m* wave, the electric field oscillates sinusoidally at a frequency of  $2.5 \times 10^{10} Hz$  and amplitude 480V/m. The amplitude of oscillating magnetic field will be,

A. 
$$1.5 imes101^{-8}Wb/m^2$$
  
B.  $1.52 imes10^{-7}Wb/m^2$   
C.  $1.6 imes10^{-6}Wb/m^2$ 

D.  $1.6 imes 10^{-7} Wb/m^2$ 

### Answer: c



62. The frequency of electromagnetic wave which is best suit to observe a particle of radius  $3 \times 10^{-4}$  is of order of:

A.  $10^{15}$ 

 $B.\,10^{14}$ 

 $C. 10^{13}$ 

D.  $10^{12}$ 

Answer: B



63. The velocity of electromagnetic radiatior in a medium of permittivity  $\varepsilon_0$  and permeability  $\mu_0$  is given by

A. 
$$rac{1}{\sqrt{\mu_0 K_0}}$$
  
B.  $rac{1}{\mu_0 K_0}$   
C.  $\sqrt{\mu_0 K_0}$ 

D. 
$$\mu_0 K_0$$

Answer: c



**64.** If  $\varepsilon_0$  and  $\mu_o$  are, respectively, the electric permittivity and magnetic permeability of free space,  $\varepsilon$  and  $\mu$  the corresponding quantities in a medium, the index of refraction of the medium in terms of the above parameters is....

A. 
$$\sqrt{\frac{\in_{0} \mu_{0}}{\in \mu}}$$
B. 
$$\sqrt{\frac{\in \mu}{\in_{0} \mu_{0}}}$$
C. 
$$\sqrt{\frac{\in}{\mu_{0} \in_{0}}}$$
D. 
$$\sqrt{\frac{\mu_{0} \in_{0}}{\in}}$$

# Answer: b

**65.** In an electromagnetic wave, the electric and magnetizing field are 100V/m and 0.265A/m. The maximum energy flow is:

A.  $26.5W/m^2$ 

 $\operatorname{B.36.5W}/m^2$ 

C.  $46.7W/m^2$ 

D.  $76.5W/m^2$ 

Answer: a



**66.** The intensity of sun lighth (in  $W/m^2$ ) at the solar surface will be:

A.  $5.6 imes10^6$ 

B.  $5.6 imes10^7$ 

 ${\sf C.4.2 imes10^6}$ 

D.  $4.2 imes 10^7$ 

Answer: b



67. The area of Television telecast is made twice, the

height of antenna will be changed as:

A. halved

B. doubled

C. quardupled

D. kept unchanged

Answer: b



**68.** Find the value of magnetic field between pates capacitor at distance 1m from center, where electric field varies by  $10^{10}V/m$  per second.

A.  $5.56 imes 10^{-8}T$ 

B.  $5.56 imes10^{-3}T$ 

 $\mathsf{C}.\,5.56\mu T$ 

 $\mathsf{D.}\,5.56T$ 

Answer: a



**69.** If a source is transmiting electric wave of frequency  $8.2 \times 10^6$  Hz, then wavelength of the electromagnetic waves transmitted from the source will be

A. 36.6m

 $\mathsf{B.}\,40.5m$ 

 $\mathsf{C.}\,42.3m$ 

 $\mathsf{D.}\,50.9m$ 

Answer: a



**70.** The wave of wavelength 5900Å emitted by any atom or molecule must have some finite total length which known as coherence length. For sodium light, this length is 2.4*cm*. The number of oscillation in this length will be,

A.  $4.068 imes 10^8$ 

 $\texttt{B.}~4.068\times10^4$ 

 $\text{C.}~4.068\times10^{6}$ 

D.  $4.068 imes 10^5$ 

Answer: b

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71. The sum delilvers  $10^4 W/m^2$  of electromagnetic flux to earth's surface. The total power that is incident on a ro of dimensions  $(10 \times 10)m^2$  will be:

A.  $10^4$ 

 $\mathsf{B}.\,10^5W$ 

 $\mathsf{C}.\,10^6W$ 

 $\mathsf{D}.\,10^7W$ 

Answer: c



**72.** The average value of electric energy density in an electromagnetic wave is ( $E_0$  is peak value):

A. 
$$\frac{1}{2}\varepsilon_0 E_0^2$$
  
B.  $\frac{E_0^2}{2\varepsilon_0}$   
C.  $\varepsilon_0 E_0^2$   
D.  $\frac{1}{4}\varepsilon_0 E_0^2$ 

# Answer: D



73. The wave impedance of free space is

**A**. 0

 $\mathrm{B.}\,376.6\Omega$ 

C. 1883 $\Omega$ 

D.  $3776\Omega$ 

Answer: C



# 74. The ferequency 1057MHz of radiation arising from

two close energy levels in hydrogen belong to:

A. radio waves

B. infrared waves

C. micro waves

D.  $\omega$ -rays

Answer: a

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**75.** The wave associated with 2.7K belong to:

A. radio waves

B. micro waves

C. ultraviolet ways

D. infrared waves



76. To which region of electromagnetic spectrum, the

frequency BHz correspond?

A. Ultraviolet wave

B. radio waves

C. visible

D. X-rays

Answer: B



77. The transmitting antenna of a radio-station is mounted verticlly. At a point electric field is 10Km1 due north of the treansmitter the peak electric field is  $10^{-3}$ volt/m meter. The amplitude of the radiated magnetic magnetic field is:

A.  $3.33 imes 10^{-10} tesla$ 

B.  $3.33 \times 10^{-12} tesla$ 

C.  $10^{-3} tesla$ 

D.  $3 imes 10^5 tesla$ 

## Answer: b



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**Communication System** 

**1.** In which frequency range, space waves are normally propagated?

A. HF

 $\mathsf{B.}\,VHF$ 

 $\mathsf{C}.\,UHF$ 

D. SHF

Answer: c



2. The waves used in telecommunication are

A. IR

 $\mathsf{B.}\,UV$ 

C. Microwaves

D. Cosmic rays

Answer: C



**3.** Long distance radio broadcasts use short wave bands. Explain why?

A. Ground wave

B. Ionosheric wave

C. Direct wave

D. Sky wave

#### Answer: c



4. The ratio waves of frequency 300MHz to 3000MHz

belong to

A. High frequency band

B. very high frequency band

- C. Ultra high frequency band
- D. super high frequence band

### Answer: c

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**5.** For television broadcasting, the frequency employed is normally

- A. 30-300MHz
- $\mathrm{B.}\,30-300GHz$
- $\mathsf{C.}\,30-300KHz$
- $\mathsf{D.}\,30-300 Hz$



of  $500 \text{cycle}/\sec ond$ ,the appropriate carrier frequency will be

A. 50 cycles/sec

B. 100 cycles/sec

C. 500 cycle/sec

D. 50,000 cycle/sec

Answer: D



**7.** Amplitude modulation is used for broad casting because

- A. It is more noise immune than other modulation system
- B. It requires less transmitting power compared

with other systems

- C. Its use avoids receiver complexity
- D. No other modulation system can provide the necessary bandwidth faithful transmission



8. Range of frequencies allotted for commercial  ${\cal F}M$ radio broadcast is

A. 88 to 108 MHz

B. 88 to 108 KHz

C. 8 to 88 MHz

D. 88 to 108 MHz

Answer: a



**9.** The velocity factor of a transmission line x. If dielectric constant of the medium is 2.6,

A. 0.26

 $\mathsf{B.}\,0.62$ 

C. 2.6

 $\mathsf{D.}\,6.2$ 

Answer: b



10. The process of superimposing signal frequency (i.e.

audio wave) on the carrier wave is known as

A. Transmission

**B.** Recception

C. Modulation

D. Detection

Answer: c



**11.** A sept index fibre has a relavitive refractive index of 0.88 %. What is the critical angle at the core-cladding interface?

A.  $60^{\circ}$ 

B.  $75^{\circ}$ 

C.  $45^{\circ}$ 

D. None of these



12. The characteristic impedance of a coaxial cable is of

the order of

A.  $50\Omega$ 

 $\mathrm{B.}\,200\Omega$ 

 $\mathsf{C.}\,270\Omega$ 

D. None of these

Answer: c



13. If  $\mu$  and  $\mu_2$  are the refractive indices of the materials of core and cladding of an optical fibre, then loss of light due to its leakage can be minimised by having

- A.  $\mu_1 > \mu_2$
- B.  $\mu_1 < \mu_2$
- $\mathsf{C}.\,\mu_1=\mu_2$
- D. None of these

#### Answer: a



**14.** Through which mode of propagation, the radio waves can be sent from one place to another

A. Ground wave propagation

B. Sky wave propagation

C. Space wave propagation

D. All of these



**15.** A laser beam of pluse power  $10^{12}$  watt is focussed on an object are  $10^{-4}cm^2$ . The energy flux in  $wa / cm^2$ at the point of focus is

A.  $10^{20}$ 

 $B.\,10^{16}$ 

 $C. 10^8$ 

D.  $10^4$ 

Answer: b



**16.** The carrier frequency generated by a tank circuit containing 1nF capacitor and  $10\mu H$  inductor is

A. 1592Hz

 $\mathsf{B}.\,1592 MHz$ 

C. 1592kHz

D. 159.2Hz

Answer: c



17. Broadcasting antennas are generally

A. Omnidirection type

B. Vertical type

C. Horizontal type

D. None of these

## Answer: b



18. What type of modulation is employed in india for

radio transmission

A. Amplitude modulation

B. Frequency modulation

- C. Pluse modulation
- D. None of these

### Answer: a



**19.** When the modulating frequency is doubled, the modulation index is halved and the modulating voltage constant the modulation system is

A. Amplitude modulation

- B. Phase modulation
- C. frequency modulation

D. All of these

## Answer: c

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20. An antenna is a device

A. That converts electromegnetic energy into radio

frequency signal

B. That covert radio frequency signal into

electromagnetic energy

C. That convert guided electromagnetic wave into

free space electromagnetic wave and vice-vesa

D. None of these

#### Answer: c



**21.** While tuning in a certain broad cast station with a

receiver, we are actually

A. Varying the local oscillator frequency

B. Varying the frequency of the radio signal to be

picked up

C. Tuning the antenna

D. None of these



A. Absorption

B. Scattering

C. Neither absorption nor scattering

D. Both (a) and (b)

Answer: d

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**23.** Laser beams are used to measure long distances because

A. They are monochromatic

B. They are highly polarised

C. They are coherent

D. They have high degree of parallelism



**24.** An antenna behaves as resonant circuit only when its length is

A. 
$$\frac{\lambda}{2}$$
  
B.  $\frac{\lambda}{4}$   
C.  $\lambda$   
D.  $\frac{\lambda}{2}$  or integral multiple of  $\frac{\lambda}{2}$ 



**25.** Television signal on earth cannot be recevied at distances greater than 100km from the transmission station. The reasion behind this is that

A. The recevier antenna is unable to detect the signal a distance greater than 100 km

B. The TV programme conists of both audio and

video signels

C. The TV signals are less powerful than radio signals

D. The surface of earth is curved like a sphere



- 26. Advantage of optical fibre
  - A. High bandwidth and EM interference
  - B. Low bandwidth and EM interference
  - C. High band width, low transmission capacity and
    - no EM interference
  - D. High bandwidth, high data transmission capacity
    - are no EM interference



- 27. In frequency modulation
  - A. The amplitude of modulated wave varies as frequency of carrier waves B. The frequency of modulated wave varies as amplitude of modulating wave C. The amplitude of modulated wave varies as amplitude of carrier wave D. The frequency of modulated wave varies as

frequency of carrier wave

#### Answer: b





**28.** Audio signal cannot be transmitted because

A. The signal has more noise

B. The signal cannot be amplified for distance

communication

C. The transmitting antenna length is very small to

depracticable

D. The signal is not a radio signal



29. What is the modulation index of an over modulated

wave

**A**. 1

B. Zero

C. < 1

D. > 1

Answer: d



30. Basically, the product modulator is

A. An amplifier

B. A mixer

C. A frequency separator

D. A phase separator

# Answer: b



**31.** If  $f_0$  and  $f_f$  represent the carrier wave frequencies for amplitude and frequency modulations respectively, then

A. 
$$f_a > f_f$$

B.  $f_a < f_f$ C.  $f_a pprox f_f$ D.  $f_a \geq f_f$ 

Answer: b



**32.** Which of the following is the disadvantage of  ${\cal F}M$ 

over AM

A. Large band width requirement

B. Large noise

C. Higher modulation power

# D. Low efficiency

#### Answer: a

# **Watch Video Solution**

**33.** In AM, the cent percent modulation is achived when

- A. Carrier amplitude = signal amplitude
- B. Carrier amplitude  $\neq$  signal amplitude
- C. Carrier frequency = signal frequency
- D. Carrier frequency  $\neq$  signal frequrancy

#### Answer: a







**35.** Maximum usable frequency (MUF) in F-region layer is x, when the critical frequency is 60 MHz and the angle of incidence is  $70^{\circ}$ , then x is

A. 150MHz

 $\mathsf{B.}\,170 MHz$ 

C. 175MHz

D. 190MHz

Answer: c



**36.** An oscillator is producing FM waves of requency 2kHz with a variation of 10kHz. What is modulating index?

A. 0.20

 $\mathsf{B.}\,5.0$ 

 $C.\,0.67$ 

 $\mathsf{D}.\,1.5$ 

Answer: b



**37.** The maximum peak ro peak voltage of an AM wire is 24mV and the minimum peak to peak voltage is 8mV. The modulation factor is

A. 10~%

B. 20~%

C. 25~%

D. 50~%



38. In the given detector circuit, the suitable value of

carrier frequency is



- A.  $<~<10^9 Hz$
- B.  $<~<10^5 Hz$
- C.  $> > 10^9 Hz$
- D. None of these

#### Answer: a

**39.** Sinusoidal carrier voltage of frequency 1.5MHzand amplitude 50V is amplitude modulated by sinusoidal voltage of frequency 10kHz producing 50% modualtion. The lower and upper side-band frequencies in kHz are

A. 1490, 1510

B. 1510, 1490

C. 
$$\frac{1}{1490}$$
,  $\frac{1}{1510}$   
D.  $\frac{1}{1510}$ ,  $\frac{1}{1490}$ 

#### Answer: A
**40.** Consider an optical communication system operating at  $\lambda = 800nm$ . Suppose, only 1% of the optical source frequency is the available channel bandwidth for optical communication. How many channels can be accommondated for transmitting audio signals requiring a bandwidth of 8kHz

A.  $4.8 imes10^8$ 

**B**. 48

 $\mathsf{C.}\,6.2 imes10^8$ 

D.  $4.8 imes10^5$ 

Answer: a



**41.** A photodetectore is made from a semiconductor. In  $_{-}(0.53)Ga_{-0.47}$ As whith  $E_{q}=0.73eV$ , what is the

maximum wavelength which it can detect?

A. 1000nm

 $\mathsf{B.}\,1703nm$ 

 $\mathsf{C.}\,500nm$ 

 $\mathsf{D}.\,173nm$ 



**42.** A ground reciever is receiving a signal at (a) 5 MHz, and (b) 100 MHz, transmitted from a ground transmitter at a height of 300 m located at a distance of 100 km, Identify whether it is coming via space wave or sky wave propagation or satellite transponder. [Radius of earth  $\approx 6.4 \times 10^6 m$ ,  $N_{\rm max}$  of ionosphere  $= 10^{12}m^3$ ]

A. Space wave

B. Sky wave propagation

C. Satellite transponder

D. All of these



**43.** An optical fibre communication system works on a wavelength of  $1.3\mu_m$ . The number of subscribers it can feed if a channel required 20kHz are

A.  $2.3 imes10^{10}$ 

B.  $1.15 imes 10^{10}$ 

 ${\rm C.1}\times10^5$ 

D. None of these



**44.** In an FM system a 7kHz signal modulates 108MHz carrier so that frequency deviation is 50kHz. The carrier swing is

A. 7.143

**B.** 8

C. 0.71

 $\mathsf{D}.\,350$ 

Answer: a



**45.** In a radio receiver, the short wave and medium wave station are tuned by using the same capacitor but coils of different inductance  $L_s$  and  $L_m$  respectively then

- A.  $L_s > L_m$
- B.  $L_s < L_m$
- $\mathsf{C}.\,L_s=L_m$
- D. None of these

### **Answer: B**



**46.** A carrier is simultaneously modulated by two sine waves with modulation indices of 0.4 and 0.3. The resultant modulated index will be

A. 1.0

 $\mathsf{B}.\,0.7$ 

 $\mathsf{C}.\,0.5$ 

 $\mathsf{D}.\,0.35$ 

Answer: c



**47.** A antenna current of an AM broadcast transmitter modulated by 50~% is 11A. The carrier current is

A. 10.35 A

 $\mathsf{B}.\,9.25\,\mathsf{A}$ 

 $\mathsf{C}.\,10~\mathsf{A}$ 

 $\mathsf{D}.\,5.5\,\mathsf{A}$ 

Answer: a



48. Because of tilting, which waves finally disappear?

A. Microwaves

B. Surface waves

C. Sky wave

D. Space waves

# Answer: b



**49.** A transmitter transmits a power of 10kW when modulation is 50~% . Power of carrier wave is

A. 5kW

 $\mathsf{B.}\,8.89kW$ 

 $\mathsf{C}.\,14kW$ 

D. 5.7kW

Answer: b



**50.** A telephone link operating at a center frequency of 10GHz is etablished. If 1% of this is a available then how many telephone channel can be simultaneously given when each telephone covering a band width of 5kHz?

A.  $2 imes 10^4$ 

B.  $2 imes 10^6$ 

 ${\sf C.}~2 imes10^4$ 

D.  $2 imes 10^6$ 

Answer: a



**51.** If a number of sine waves with modulation indices  $n_1, n_2, n_3$ ... modulate a carrier wave, then total modulation index (n) of the wave is

A. 
$$n_1 + n_2 \dots + 2(n_1 + n_2 \dots)$$

B.  $\sqrt{n_1 - n_2 + n_3 \dots}$ 

C.  $\sqrt{n_1^2 + n_2^2 + n_3^2 \dots}$ 

D. None of these

### Answer: c

Watch Video Solution

**52.** A transmitter supplies 9kW to the aerial when unmodulated. The power radiation when modulated to 40% is

A. 5kW

 $\mathsf{B}.\,9.72kW$ 

 $\mathsf{C.}\,10kW$ 

# D. 12kW

# Answer: b

# Watch Video Solution

**53.** The antenna current of an AM transmitter is 8A when only the carrier is sent but increases to 8.96A when the carrier is modulated sinusoidally . The percentage modulation is

A. 50~%

 $\mathbf{B.\,60~\%}$ 

 $\mathsf{C.}\,65\,\%$ 

D. 71~%

# Answer: d



54. An AM wave has 1800 watt of total power content, For 100~% modulation the carrier should have power content equal to

A.  $1000 \ \mathrm{watt}$ 

 ${\rm B.}\,1200~{\rm watt}$ 

 $\operatorname{C.}1500 \text{ watt}$ 

 $\mathsf{D.}\ 1600 \text{ watt}$ 



**55.** In an FM system a 7kHz signal modulates 108MHz carrier so that frequency deviation is 50kHz. The carrier swing is

A.7.143

**B.** 8

C. 0.71

D.350

Answer: a



# 56. In which of the following remote sensing technique

is not used?

A. Forest density

**B.** Pollution

C. Wetland mapping

D. Medical treatment

# Answer: d

Watch Video Solution

**57.** The total power content of an AM wave is 1500 W. For 100 % modulation, the power transmitted by the carrier swing of 200kHz and a modulating signal 10kHz is

A. 500W

 $\mathsf{B.}\,700W$ 

 $\mathsf{C.}~750W$ 

 $\mathsf{D.}\ 1000W$ 

Answer: D

Watch Video Solution

**58.** The modulation index of an FM carrier having a carrier swing of 200kHz and a modulating signal 10kHz is

**A**. 5

 $B.\,10$ 

C. 20

 $\mathsf{D.}\,25$ 



**59.** A 1500 Hz modulating voltage fed into an FM generator produces a frequency deviation of 2.25kHz. If amplitude of the voltage is kept constant but frequency is raised to 6kHz then the new deviation will be

A. 4.5kHz

B. 54kHz

C. 27kHz

D. 15kHz

Answer: b

Watch Video Solution

**60.** The bit rate for a signal, which has a sampling rate of 8kHz and whare 16 quantisation levels have been used is

A. 32000 bits/sec

B. 16000 bits/sec

C. 64000 bits/sec

D. 72000 bits/sec

Answer: a



**61.** Figure shows a capacitor made of two circular plates each of radius 12cm, and separated by 5.0cm. the capacitor is being charged by an external source (not shown in the figure). The charging current is constant and equal to 0.15A

(a) Calcuate the capacitance and the rate of change of potential difference between the plates

(b) Obtain the displacement current across the plates

(c) Is kirchhoff's first rule(junction rule) vaild at each

plate of the capacitor ? Explain.



A.  $1.873 imes 10^7 V/s$ 

B.  $1.873 imes 10^8 V/s$ 

C.  $1.873 imes 10^9 V/s$ 

D.  $1.873 imes 10^{10} V/s$ 

Answer: c



**1.** The sun delivers  $10^3 W/m^2$  of electromagnetic flux to the earth's surface. The total power that is incident on a roof of dimensions 8m imes 20m, will be

A.  $2.56 imes 10^4 W$ 

B.  $6.4 imes10^5W$ 

C.  $4.0 imes10^5W$ 

D.  $1.6 imes 10^5 W$ 

Answer: D

Watch Video Solution

**2.** In previous question, the radiation froce on the roof will be:

A. 
$$8.53 imes 10^{-5}N$$

B.  $2.3 imes 10^{-3}N$ 

C.  $1.33 imes 10^{-3}N$ 

D.  $5.33 imes 10^{-4}N$ 

### Answer: d



3. A plane electromagnetic wave of wave intensity  $6W/m^2$  strikes a small mirror of area  $9cm^2$ , held

perpendicular to the approaching wave. The momentum transferred in kg-ms by the wave to the mirror each second will be:

A. 
$$1.2 imes10^{-10}$$

- B.  $2.4 imes10^{-9}$
- C.  $3.6 imes 10^{-8}$
- D.  $4.8 imes 10^{-7}$

Answer: a



**4.** A lamp emits monochromatic green light uniformly in all directions. The lamp is 3% efficient in converting electrical power to electromagnetic waves and consumes 100W of power. The amplitude of the electric field associated with the electromagnetic radiation at a distance of 5 m from the lamp will be:

A. 1.34V/m

B. 2.68V/m

 $\mathsf{C.}\,4.02V/m$ 

D. 5.36V/m



**5.** Instantaneous displacement current of 1.0 A in the space between the paraller plates of  $1\mu F$  capacitor can be established by changing potential difference of:

A. 
$$10^{-6}V/s$$
  
B.  $10^{6}V/s$   
C.  $10^{-8}V/s$   
D.  $10^{8}V/s$ 



**6.** In an apparatus the electric field was found to oscillate with an amplitude of 18 V/m. The magnitude of the oscillating magnrtic field will be

A. 
$$4 imes 10^{-6}T$$

- B.  $6 imes 10^{-8}T$
- ${\sf C}.\,9 imes10^{-9}T$

D. 
$$11 imes 10^{-11}T$$



7. A point source, of electromagnetic radiation has average power output of 800 W. The maximum value electric at a distance 4.0 m from the source is:

A. 64.7V/m

B. 57.8V/m

C. 56.72V/m

D. 54.77V/m

Answer: d



8. A plane electromagnetic wave

 $F_s = 100 \cosig(6 imes 10^8 t + 4 xig) V \,/\,m$  propagates in a

medium of dielectric constant. The refractive index is

A. 1.5

 $\mathsf{B.}\,2.0$ 

C. 2.4

 $\mathsf{D.}\,4.0$ 

Answer: B



9. The average energy-density of electromagnetic wave given by  $E=(50N/C){
m sin}(\omega t-kx)$  will be nearly: A.  $10^{-8}j/m^3$ 

- B.  $10^{-7} j/m^3$
- C.  $10^{-6} j/m^3$
- D.  $10^5 j/m^3$

Answer: a



**10.** A circular ring of radius r is placed in a homogeneous magnetic field perendicular to the plane of the ring. The field B changes with time according to the equation B=kt where K is constant and r is the time. The electric field in the ring is:

A. 
$$\frac{Kr}{4}$$
  
B.  $\frac{Kr}{3}$   
C.  $\frac{Kr}{2}$   
D.  $\frac{K}{2r}$ 

### Answer: c

**11.** A plane electromagnetic wave of intensity of  $10W/m^2$  strikes a small mmirror of area  $20cm^2$ , held perpendicular to the approcaching wave. The radiation froce on the mirror will be:

A.  $6.6\times10^{-11}$  N

 $\texttt{B}.\,1.33\times10^{-11}~\texttt{N}$ 

C.  $1.33 imes10^{-10}$  N

D.  $6.6 imes10^{-10}$  N

#### Answer: c



12. A larger parallel plate capactior, whose plates have an area of  $1m^2$  are separated each other by 1 mm, is the plates has the dielectric constant 10, then the displacement current at this instant is:

A.  $25\mu$  A

B.  $11\mu$  A

 $\mathsf{C.}\,2.2\mu\,\mathsf{A}$ 

D.  $1.1\mu$  A

Answer: c

Watch Video Solution

**13.** ATV tower has a height of 100m. How much population is covered by TV broadcast. If the average population density around the tower is  $1000km^{-2}$ ? (radius of earth = $6.4 \times 10^6 m$ )

A. 4 lakh

B.4 billion

C. 40, 000

 $\mathsf{D.}\,40\,\mathsf{lakh}$ 

Answer: D

Watch Video Solution

**14.** A parallel- plate capacitor with plate area A and separation between the plates d, is charged by a constant current i. Consider a plane surface of area A/2 parallel to the plates and drawn summetrically between the plates. Find the displacement current through this area.

**A**. *i* 

 $\mathsf{B.}\,i\,/\,2$ 

C. i/4

D. i/8


15. In a region of free space the electric at some instant of time to  $\overrightarrow{E}=\left(80\hat{i}+32\hat{j}-64\hat{k}
ight)$  and the magnetic field is  $\overrightarrow{B}=\left(0.2\hat{i}+0.08\hat{j}-0.29\hat{k}
ight)\mu$  T. The pointing

vector for these field is:

A.  $-11.52\hat{i}+28.8\hat{j}$ B.  $-28.8\hat{i}+11.52\hat{j}$ 

C.  $28.8\hat{j} - 11.52\hat{j}$ 

D.  $11.52\hat{i}-28.8\hat{j}$ 

## Answer: D



**16.** A plane electromagnetic wave propagating in the xdirection has wavelength of 60 mm. The electric field is in the y-direction and its maximum magnitude is  $33V/m^{-1}$ . The equation for the electric field as function of x and t is:

A. 
$$11\sin\pi(t-x/c)$$

- B.  $33\sin\pi imes 10^{11}(t-x/c)$
- C.  $33\sin\pi(t-x/c)$
- D.  $11\sin\pi imes 10^{11}(t-x\,/\,c)$

## Answer: b



17. An LC current contains inductance  $L=1\mu$  H and capacitance  $C=0.01\mu F$ . The wavelength of electromagnetic wave generated is nearly:

A. 0.5m

 $\mathsf{B.}\,5m$ 

 $\mathsf{C.}\,188m$ 

 $\mathsf{D.}\,30m$ 

Answer: c



**18.** Radiowaves of wavelength 360 m are transmitted from a transmitter. The inductance of the coil which must be connected with capacitor of capacity  $3.6\mu F$  in a resonant citcuit to receive these waves will be appoximately

A.  $10^3 H$ 

B.  $10^{2}H$ 

 $C. 10^{-4} H$ 

D.  $10^{-8}H$ 

Answer: d

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**19.** A parallel plate capacitor consists of two circular plates each of radius 2cm, separated by a distance of 0.1mm. Ifvoltage across the plates is varying at the rate of  $5 \times 10^{13} V/s$ , then the value of displacement current is :

A.~5.50~A

B.  $5.56 imes10^2$  A

C.  $5.56 imes10^3$  A

D.  $2.28 imes 10^4$  A

Answer: c

Watch Video Solution

20. In an electromagnetic wave, the electric field oscillated sinusoidally with amplitude  $45V/m^{-1}$ . The RMS value of oscillating magnetic field will be:

A. 
$$1.6 imes10^{-8}$$
 T

- B.  $16 imes 10^{-9}$  T
- C.  $144 imes 10^8$  T
- D.  $11.3 imes 10^{-8}$  T

### Answer: D



**21.** The magnetic field in the plane electromagnetic wave is given by

 $B_z = 2 imes 10^{-7} \sinig( 0.5 imes 10^3 x + 1.5 imes 10^{11} t ig)$  tesla. The expression for electric field will be:

A. 
$$E_z=30\sqrt{2}\sinig(0.5 imes10^3x+1.5 imes10^{11}tig)V/m$$
  
B.  $E_z=60\sinig(0.5 imes10^3x+1.5 imes10^{11}tig)V/m$   
C.  $E_y=30\sqrt{2}\sinig(0.5 imes10^{11}x+0.5 imes10^3tig)V/m$   
D.  $E_y=60\sinig(0.5 imes10^3x+1.5 imes10^{11}tig)V/m$ 

## **Answer: D**



22. What is the amplitude of electric field produced by radiation coming from a 100 W bulb at a distance of 4 m? Assume efficiency of bulb to be 3.14% and assume it to the point source:

A. 2.42V/m

 $\operatorname{B.3.43V}/m$ 

C.  $4.2 imes 10^4 V/m$ 

D.  $14 imes 10^4V$ . m

Answer: b



**23.** The frequency band used for radar relay systems and television-

A. UHF

B. VLF

C. VHF

D. EHF

Answer: a



24. In frequency modulation

A. The amplitude of modulated wave varies as frequency of carrier waves B. The frequency of modulated wave varies as amplitude of modulating wave C. The amplitude of modulated wave varies as amplitude wave varies as amplitude of carrier wave

D. The frequency of modulated wave varies as

frequency of modulating wave

Answer: b

Watch Video Solution

25. Audio signal cannot be transmitted because

A. The signal has more noise

B. The signal cannot be amplified for distance

communication

- C. of the transmitting antennal length
- D. None of these

Answer: d



26. In which of the following remote sensing technique

is not used?

A. Forest density

**B.** Pollution

C. Ground water survey

D. Medical treatment

Answer: d



**27.** If the area to be covered for TV telecast is doubles then height of transmitting antenna (TV tower) will have to be:

A. doubled

B. halved

C. quardupled

D. kept unchanged

Answer: a



28. Refractive index of ionosphere is:

A. zero

B. more than one

C. less than one

D. one

Answer: c



29. Electromagnetic waves with frequency greater than

the critical frequency of ionosphere cannot be used for

communication using sky wave propagation, because:

A. the refractive index of the ionosphere becomes

very high  $f > f_c$ 

B. the refractive index of the ionosphere very high

 $\mathsf{low}\, f > f_c$ 

C. the refreactive index of the ionosphere very high

for  $f > f_c$ 

D. None of these

Answer: a



**30.** A step index fibre has critical angel at the corecladding interface ?

A.  $60\,^\circ$ 

B.  $75^{\circ}$ 

C.  $45^{\circ}$ 

D. None of these

Answer: d



**31.** If  $\mu_1$  and  $\mu_2$  are the refractive indices of the materials of core and cladding of an optical fibre, then the loss of light due to its leakage can be minimized by having

A.  $\mu_1 > \mu_2$ 

B.  $\mu_1 < \mu_2$ 

 $\mathsf{C}.\,\mu_1=\mu_2$ 

D. None of these

## Answer: a



**32.** A laser beam of pluse power  $10^{12}$  watt is focussed on an object are  $10^{-4}cm^2$ . The energy flux in  $wa / cm^2$ at the point of focus is

A.  $10^{20}$ 

B.  $10^{16}$ 

 $C. 10^8$ 

D.  $10^4$ 

Answer: b



**33.** The carrier frequency generated by a tank circuit containing 1nF capacitor and  $10\mu H$  inductor is

A. 1592Hz

 $\mathsf{B.}\,1592 MHz$ 

C. 1592kHz

D. 159.2Hz

Answer: c



**34.** A sky wave with a frequency 55 MHz is incident on Dregion of earth's atmosphere at  $45^{\circ}$ . The angle of refraction is (electorn density for D-region is  $400 \text{electron} / cm_3$ )

A.  $60^{\circ}$ 

B.  $45^{\circ}$ 

C.  $30^{\circ}$ 

D.  $15^{\,\circ}$ 

# Answer: b



35. Calculate the phase velocity of electromagnetic wave having electromagnetic density and frequency for D layer,  $N=400 {
m electron}/{cm^3}, v=300 kHz$ 

A.  $3 imes 10^8 ms_1$ 

B.  $3.75 imes10^8ms^{-1}$ 

C.  $6.8 imes10^8ms^{-1}$ 

D.  $1.1 imes 10^9 ms^{-1}$ 

Answer: b



**36.** A T.V. tower has a height of 100m. How much population is covered by T.V. broadcast, if the population density around the tower is  $1000 / km^2$ ?

A.  $39.5 imes 10^5$ 

B.  $19.5 imes10^6$ 

C.  $29.5 imes10^7$ 

 $extsf{D.}9 imes10^4$ 

Answer: a

**Watch Video Solution** 

**37.** A parallel plate capacitor consists of two circular plates each of radius 12*cm* and separated by 5.0*mm*. The capacitor is being charge by an external source. The charging current is constant and is equal to 0.15 A. The rate of change of potential difference between the plate will be

A.  $8.173 imes10^7Vs^{-1}$ B.  $7.817 imes10^8Vs^{-1}$ 

C.  $1.173 imes 10^9 Vc^{-1}$ 

D.  $3.781 imes10^{10}Vs^{-1}$ 

### Answer: c



**38.** A flood light is covered with a fitter than transmits red light. The electric field of the emerging beam is represented a sinusolidal plane wave

 $E_x = 36 \sinig(1.20 imes 10^7 z - 3.6 imes 10^{15} tig) V/m$ 

The average intensity of beam is  $\mathrm{watt}\,/\,\mathrm{(metre)}^2$  will be

A. 6.88

B. 3.44

 $C.\,1.72$ 

D. 0.86

#### Answer: c

Match Video Colution

**39.** The figure here gives the electric field of an EM wave at a certain point and a certain. The wave is transporting energy in the negative z direction. What is the direction of the magnetic field of the wave at the point and instant?



# A. Towards + X direction

- B. Towards X direction
- C. Towards + direction
- D. Towards Z direction

### Answer: a



# Section B Assertion Reasoning

 Assertion: The electromagnetic waves of shorter wavelength can travel longer distances on earth's surface thane those of longer of longer wavelengths.
 Reason: Shorter the wavelength, the larger is the velocity of wave propagation. Also, shorter the wavelength, shorter is the velocity of wave propagation.

A. If both assertion and reason are true and reason

is the correct explanation of assertion.

B. If both assertion and reason are true but reason

is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion and reason both are false.

## Answer: C



2. Assertion: The surface wave propagation is used for medium wave band and for television broadcasting. Reason: The surface waves travel directly from transmitting antenna to receiver antenna through atmosphere.

- A. If both assertion and reason are true and reason is the correct explanation of assertion.
  - B. If both assertion and reasion are true but reason
    - is not the correct explanation of assertion.
  - C. If assertion is true but reasion is false.
- D. If assertion and reason both are false.

Answer: a



**3.** Assertion: The television broadcasting becomes weaker with increasing distance.

Reason: The power transmitted from T.V. transmitter varies inversely as the distance of the receiver.

A. If both assertion and reason are true and reason

is the correct explanation of assertion.

B. If both assertion and reasion are true but reason

is not the correct explanation of assertion.

C. If assertion is true but reasion is false.

D. If assertion and reason both are false.

# Answer: c



**4.** Assertion: The Microwave propagation is better than the sky wave propagation.

Reason: Microwaves have frequency 100 to `3001 GHz,

which have very good directional properties.

A. If both assertion and reason are true and reason

is the correct explanation of assertion.

B. If both assertion and reason are true but reason

is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion and reason both are false.

Answer: A

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**5.** Assertion: Satellite is an ideal platform for remote sensing.

Reasion: Satellite in poplar orbit can provide global coverage or continuous coverage of the fixed area in geostationary configuration. A. If both assertion and reason are true and reason

is the correct explanation of assertion.

B. If both assertion and reasion are true but reason

is not the correct explanation of assertion.

C. If assertion is true but reasion is false.

D. If assertion and reason both are false.

Answer: a

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**6.** Is it necessary to use satellite for long distance T.V. transmission? Give reasons.

A. If both assertion and reason are true and reason

is the correct explanation of assertion.

B. If both assertion and reasion are true but reason

is not the correct explanation of assertion.

C. If assertion is true but reasion is false.

D. If assertion and reason both are false.

### Answer: c

Watch Video Solution

**7.** Assertion: In Hertz experiment, the electric vector of radiation produced by the source gap is parallel top

the gap.

Reasion: Production of sparks between the detector gap is maximum when it is placed perpendicular to the source gap.

A. If both assertion and reason are true and reason

is the correct explanation of assertion.

B. If both assertion and reasion are true but reason

is not the correct explanation of assertion.

C. If assertion is true but reasion is false.

D. If assertion and reason both are false.

Answer: c



**8.** Assertion: For cooking in a microwave oven, food is always kept in metal containers.

Reasion: The energy of microwave is easily transferred to the food in metal container.

A. If both assertion and reason are true and reason

is the correct explanation of assertion.

B. If both assertion and reasion are true but reason

is not the correct explanation of assertion.

C. If assertion is true but reasion is false.

D. If assertion and reason both are false.

Answer: d



**9.** Assertion: X-ray astronomy is possible only from satellites orbiting the earth.

Reasion: Efficiency of X-rays telescope is large as compared to any other telescope.

A. If both assertion and reason are true and reason

is the correct explanation of assertion.

B. If both assertion and reasion are true but reason

is not the correct explanation of assertion.

C. If assertion is true but reasion is false.

D. If assertion and reason both are false.
#### Answer: c



10. Statement-1: Short wave band are used for transmission fo radiowaves to a large distance.
Statement-2: Short waves are reflected from ionosphere.

A. If both assertion and reason are true and reason

is the correct explanation of assertion.

B. If both assertion and reasion are true but reason

is not the correct explanation of assertion.

C. If assertion is true but reasion is false.

D. If assertion and reason both are false.

## Answer: b

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11. Assertion: Ultraviolet radiation are of higher
frequency waves are dangerous to huhman beaing.
Reasion: Ultraviolet radiation are absorbed by the
atmosphere

A. If both assertion and reason are true and reason

is the correct explanation of assertion.

B. If both assertion and reasion are true but reason

is not the correct explanation of assertion.

C. If assertion is true but reasion is false.

D. If assertion and reason both are false.

#### Answer: b



12. Assertion: Environment damage has increased the amount of ozone in the atmosphere.Reason: Increase of ozone increases the amount of

ultraviolet radiation on earth.

A. If both assertion and reason are true and reason

is the correct explanation of assertion.

B. If both assertion and reasion are true but reason

is not the correct explanation of assertion.

C. If assertion is true but reasion is false.

D. If assertion and reason both are false.

Answer: d

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13. Assertion: Radio waves can be polarised.

Reason: Sound waves in air are longitudinal in nature.

A. If both assertion and reason are true and reason

is the correct explanation of assertion.

B. If both assertion and reasion are true but reason

is not the correct explanation of assertion.

C. If assertion is true but reasion is false.

D. If assertion and reason both are false.

Answer: b

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**Aipmt Neet Questions** 

1. Which of the following is positively charged?

A.  $\alpha$ -Particle

B.  $\beta$ -particle

C.  $\gamma$ -rays

D. X-rays

Answer: a

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2. Which of the following shows greenhouse effect?

A. Ultraviolet rays

B. Infrared rays

 $\mathsf{C}.\,X\text{-}\mathsf{rays}$ 

D. None of these

Answer: b



3. Which of the following are not electromagnetic

waves ?

A. Cosmic rays

B. Gamma rays

C.  $\beta$ -rays

# $\mathsf{D}.\,X\text{-}\mathsf{rays}$

#### Answer: c

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**4.** The electric and magnetic field of an electromagnetic wave is

A. in phase and parallel to each other

B. in opposite phase and perpenducular to each

other

C. in opposite phase and parallel to each other

D. in phase and perpenducular to each other



B. 
$$\sqrt{\mu_0 \varepsilon_0}$$

C. 
$$rac{1}{\sqrt{\mu_0 arepsilon_0}}$$
  
D.  $\sqrt{rac{\mu_0}{arepsilon_0}}$ 

#### Answer: c

**6.** The electric field part of an electromagnetic wave in a medium is represented by

 $egin{aligned} E_x &= 0, \ E_y &= 2.5 rac{N}{C} \mathrm{cos} iggl[ iggl( 2\pi imes 10^6 rac{rad}{m} iggr) t - iggl( \pi imes 10^{-2} rac{rad}{s} iggr) x iggr] \ E_z &= 0. \end{aligned}$ 

The wave is

A. moving along y-direction with frequency  $2\pi imes 10^6 Hz$  and wavelength 200m.

B. moving along x-direction with frequency  $10^6 Hz$ 

and wavelength 100m

C. moving along x-direction with frequency  $10^6 Hz$ 

and wavelength 100m

D. moving along x-direction with frequency  $10^6 Hz$ 

and wavelength 200m

#### Answer: D



**7.** Which of the following statement is false for the properties of electromagnetic waves?

A. Both electric and magnetic field vectors attain

the maxmum and minimum at the same place

and the same time

- B. The energy in electromagetic wave is divided equally between electric and magnetic field and vectors
- C. Both electric and magnetic field vectors are parallel to each other and perpendicular to the direction of propagation of wave
- D. These wave do not requrie any material medium

for propagation

Answer:

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8. The electric and the magnetic field, associted with an electromagnetic wave, propagating along the  $+x - a\xi s$ , can be represented by

A. 
$$\left[E=E_0\hat{k},B=B_0\hat{i}
ight]$$
  
B.  $\left[E=E_0\hat{j},B=B_0\hat{j}
ight]$   
C.  $\left[E=E_0\hat{j},B=B_0\hat{k}
ight]$   
D.  $\left[E=E_0\hat{i},B=B_0\hat{j}
ight]$ 

#### **Answer:**

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**9.** The dereasing order of wavelength of infrared, microwave, ultraviloet and gammsa rays is

A. gamma rays, ultraviloet, infrared, microwaves

B. microwaves, gamma rays, infrared, ultraviloet

C. infrared, microwave, ultraviloet, gamma rays

D. microwave infrared, ultraviloet, gamma rays

Answer: d



10. The electric field associted with an electromagnetic

wave in vacuum is given by  $\overrightarrow{E} = \hat{i} 40 \cos \left(kz = 6 imes 10^8 t
ight)$ , when *E*, z and t are in volt//m, metre and second respectively

A.  $2m^{-1}$ 

B.  $0.5m^{-1}$ 

C.  $6m^{-1}$ 

D.  $3m^{-1}$ 

#### Answer: d



**11.** The ratio of amplitude of magnetic field to the amplitude of electric field for an electromagnetic wave propagating in vacumm is equal to

A. the speed of light in vacuum

B. reciprocal of speed of light in vacuum

C. the ratio of magnetic permeability to the electric

suscepitibility of vacuum

D. Unity

Answer: a

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12. Light with an enargy flux of  $25 \times 10^4 Wm^{-2}$  falls on a perfectly reflecting surface at normal incidence. If the surface area is  $15cm^2$ , the average force exerted on the surface is

A.  $1.25 imes 10^{-6}N$ 

B.  $2.50 imes10^{-6}N$ 

C.  $1.20 imes10^{-6}N$ 

D.  $3.0 imes10^{-6}N$ 

### Answer: b



**13.** A radiation of energy E falls normally on a perfctly refelecting surface . The momentum transferred to the surface is

A. 
$$\frac{E}{C}$$
  
B.  $\frac{2E}{C}$   
C.  $\frac{2E}{C^2}$   
D.  $\frac{E}{C^2}$ 

#### Answer: b



**14.** The energy of the electromagetic wave is of the order of 15 keV. To which part of the spectrum dose it belong?

A.  $\gamma$ -rays

B. X-rays

C. Infrared rays

D. Ultraviolet rays

**Answer: B** 



15. Out of the following options which one can be used

produce a propagating electromagnetic wave?

A. A charge moving at constsnt velocity

B. A stationary charge

C. A chargeless particle

D. An accelerating charge

Answer: b



**16.** A  $100\Omega$  resistance and a capacitor of  $100\Omega$  reactance are connected in series across a 220 V source. When the capacitor is 50 % charged, the peak value of the displacement current is

A. 4.4A

B.  $11\sqrt{2}A$ 

 $\mathsf{C.}\,2.2A$ 

 $\mathsf{D.}\,11A$ 

#### Answer: C



17. In an electromagnetic wave in free space the root square value of the electric field is mean  $E_{rms} = 6V/m$ . The peak value of the magnetic field is A.  $2.83 imes 10^{-8}T$ B.  $0.70 imes10^{-8}T$ C.  $4.23 imes 10^{-8}T$ D.  $1.41 \times 10^{-8}T$ 

Answer: A



**18.** An em wave is propagating in a medium whith a velocity  $\overrightarrow{v} = v\hat{i}$ . The instantaneous oscillating electric field of this of em wave is along +y axis. Then the direction of oscillating magnetic field of the em wave will be along

A. -x direction

- B. -z direction
- C. y direction
- $\mathsf{D.} + z$  direction

## Answer: D



**1.** The frequency of a FM transmitter without signal input is called

A. Lower side b and frequency

B. Upper side b and frequency

C. Resting frequency

D. None of these

Answer: c



2. Indicate which one of the following system is digital

A. Pulse position modulation

B. Pulse code modulation

C. Pulse width modulation

D. Pulse amplitude modulation

# Answer: b



**3.** In a communication system, noise is most likely to affect the signal

A. At the transmitter

B. In the channel or the transmission line

C. In the infromation source

D. At the receiver

# Answer: b



**4.** An amplitude modulated wave is modulated to 50~% .

What is the saving in power if carrier as well as one of

the side band are suppressed?

 $\mathsf{B.}\,65.4\,\%$ 

 $\mathsf{C}.\,94.4\,\%$ 

D. 25.5~%

Answer: c



5. The audio signal used to modulate  $60\sinig(2\pi imes10^6tig)$ 

is  $15 \sin 300 \pi t$ . The depth of modulation is

A. 50~%

 $\mathsf{B.}\,40~\%$ 

C. 25~%

D. 15~%

#### Answer: c



**6.** The total power content of an AM wave is 900 W. For 100~% modulation, the power transmitted by each side band is

A. 50W

 $\mathsf{B.}\,100W$ 

 $\mathsf{C.}\,150W$ 

 $\mathsf{D.}\ 200W$ 

# Answer: c Watch Video Solution

7. In a diode AM- detector, the output circuit consist of  $R=1k\Omega$  and C=10pF. A carrier signal of 100kHz is to be detected. Is it good?

A. Yes

B. No

C. Infromation is not sufficient

D. None of these

Answer: b



**8.** Mean optical power launched into an 8km fibre is  $120\mu W$  and mean output power is  $4\mu W$ , then the overall attenuation is (Given log 30 = 1.477)

A. 14.77 dB

 $\mathsf{B}.\,16.77\,\mathsf{dB}$ 

 $\mathsf{C}.\,3.01~\mathsf{dB}$ 

D. None of these

Answer: a



**9.** A sky wave with a frequency 55 MHz is incident on Dregion of earth's atmosphere at  $45^{\circ}$ . The angle of refraction is (electorn density for D-region is  $400 \text{electron} / cm_3$ )

A.  $60^{\circ}$ 

B.  $45^{\circ}$ 

C.  $30^{\circ}$ 

D.  $15^{\,\circ}$ 

#### Answer: b



10. The electromagnetic wave of frequency 2 MHz to 30

MHz are

A. In ground wave propagation

B. In sky wave propagation

C. In microwave propagation

D. Both (a) and (b)

## Answer: b

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**11.** Laser light is considered to be coherent because it consists of

- A. Many wavelengths
- B. Uncoordinated wave of many wavelength
- C. Coordinated wave of many wavelengths
- D. Coordinated wave of a particular wavelength

# Answer: d



# 12. The phenomenon by which light travels in an optical

fibres is

A. Reflection

**B.** Refraction

- C. Total internal reflection
- D. Transmission

#### Answer: c

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**13.** The electron dencity of  $E, F_1, F_2$  layers of ionosphere is  $2 \times 10^{11}, 5 \times 10^{11}$  and  $8 \times 10^{11} m^{-3}$  respectively. Wht is the ratio of critical frequency for reflection of radiowaves?

A. 2:4:3

B. 4: 3: 2

C.2:3:4

D. 3:2:4

Answer: c

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14. The impedance of coaxial cable, when its inductance is  $0.40 \mu H$  and cappacitance is  $1 imes 10^{-11} F$ , can be

A.  $2 imes 10^2\Omega$ 

 $\mathrm{B.}\,100\Omega$ 

C.  $3 imes 10^3\Omega$ 

D.  $3 imes 10^{-2}\Omega$ 



**15.** Consider telecommunication through optical fibres. Which of the following statements is not true?

A. Optical fibre may have homogeneous core with a

suitable cladding

- B. Optical fibre can be of graded refractive index
- C. Optical fibre are subject to electromagnetic

interference from outside
D. Optical fibres have extremely low transmission

loss

Answer: c

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**16.** Which of the following statement is wrong?

A. Infrared photon has more energy than the

photon of visible light

B. Photographic plates are sensitive to ultraviloet

rays

C. Photographic plates can be made sensitive to

infrared rays

D. Infrared rays are invisible but can shadow like

visible light rays

Answer: a

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17. Pick out the longest wavelength from the following

types of radiation

A. Blue light

B. Y-rays

C. X-rays

D. Red ligth

## Answer: d

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# 18. Wave which cannot travel in vacumm is

A. X-rays

B. Infrasonic

C. Ultraviloet

D. Radiowaves





19. In an electromagnetic wave, the electric and magnetizing field are 100V/m and 0.265A/m. The maximum energy flow is:

A.  $2.6W/m^2$ B.  $36.5W/m^2$ 

C.  $46.7W/m^2$ 

D.  $765W/m^2$ 



**20.** The 21cm radio wave emitted by hydrogen in interstellar space is due to the interaction called the hyperfine interaction is atomic hydrogen. The energy of the emitted wave is nearly

- A.  $10^{-7}$  joule
- B. 1 joule
- C.  $7 imes 10^{-8}$  joule
- D.  $10^{-24}$  joule

Answer: d



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**21.** TV waves have a wavelength range of 1-10 meter.

Their frequency range in MHz is

- A. 30 300
- B.3 30
- C.300 3000
- D.3 3000



22. Maxwell's equations describe the fundamental laws

of

A. Electricity only

B. Magnetism only

C. Mechanics only

D. Both (a) and (b)

Answer: d



**23.** A point source of electromagnetic radiation has an average power output of 800W. The maximum value of elecvtric field at a distance 4.0m from the source is

A. 64.7V/m

B. 57.8V/m

C. 56.72V/m

D. 54.77V/m

Answer: d



**24.** For sky wave propagation of a 10MHz signal, what should be the minimum electron density in ionosphere?

A. ~
$$1.2 imes 10^{12} m^{-3}$$
  
B. ~ $10^6 m^{-3}$   
C. ~ $10^{14} m^{-3}$ 

D. ~
$$10^{22}m^{-3}$$



25. Show that the radiation pressure exerted by an EM wave of intensity I on a surface kept in vacuum is I/c.

A.  $I_c$ 

 $\mathsf{B.}\,Ic^2$ 

 $\mathsf{C}.\,I\,/\,c$ 

D.  $I/c^2$ 

Answer: c



**26.** A plane electromagnetic wave of wave intensity  $6W/m^2$  strikes a small mirror of area 40cm(2), held perpendicular to the approaching wave. The momentum transferred by the wave to the mirror each second will be

A. 
$$6.4 imes10^{-7}kg-m/s^2$$

B. 
$$4.8 imes 10^{-8} kg - m\,/\,s^2$$

C. 
$$3.2 imes 10^{-9} kg - m\,/\,s^2$$

D. 
$$1.6 imes 10^{-10} kg - m \, / \, s^2$$

#### Answer: D

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**27.** A wave is propagating in a medium of electric dielectric constant 2 and relative magnetic permeability 50. The wave impeldance of such a medium is

A.  $5\Omega$ 

 $\mathrm{B.}\,376.6\Omega$ 

C.  $1883\Omega$ 

D.  $3776\Omega$ 

Answer: c



**28.** Assertion: X-ray astronomy is possible only from satellites orbiting the earth.

Reasion: Efficiency of X-rays telescope is large as compared to any other telescope.

A. If both assertion and reason are true and reason

is the correct explanation of assertion.

B. If both assertion and reasion are true but reason

is not the correct explanation of assertion.

C. If assertion is true but reasion is false.

D. If assertion and reason both are false.

#### Answer: c





**29.** Assertion: A dish antenna is highly directional. Reasion: This is because a dipole antenna omnidirectional.

A. If both assertion and reason are true and reason

is the correct explanation of assertion.

B. If both assertion and reasion are true but reason

is not the correct explanation of assertion.

C. If assertion is true but reasion is false.

D. If assertion and reason both are false.

Answer: b



**30.** Assertion: Only microwaves are used in radar.

Reason: Because microwaves have very small wavelength.

A. If both assertion and reason are true and reason

is the correct explanation of assertion.

B. If both assertion and reasion are true but reason

is not the correct explanation of assertion.

C. If assertion is true but reasion is false.

D. If assertion and reason both are false.

