-------------------------Chapter – 7th--------------------------

1. Wave equation for the electrical field while moving light along the X-axis in the vacuum,?

Hints: = electric field, , c = Speed of light in the void, λ = wavelength (Page: 212 | FIG: 7.1)

1. *=*  (ans.)
2. *=*
3. *=*
4. *=*

Ans:  *=*

Prove:

is that the wave equation that can be written for a sine-like variable electrical field in -location at time is:

*=*

Here, is a sign-like variable electric field in -position at the time of , the speed of light in zero position and the λ are wavelengths. So perpendicular to the direction of light transmission and is the expansion or top value of the electric field.

1. Which is the wave equation for magnetic field ?

Hints: = magnetic field, Top values of magnetic fields, c = Speed of light in the void, λ = wavelength (Page: 212 | FIG: 7.1)

1. *=*  (ans.)
2. *=*
3. *=*
4. *=*

Ans:  *=*

Prove:

Here is that the wave equation that can be written for a sine-like variable electrical field in -location at time is:

*=*

Here, is a sine-like variable electric field in -position at the time of , the speed of light in zero position and the λ are wavelengths. So perpendicular to the direction of light transmission and is the expansion or top value of the electric field. When light is transmitted, the electric field is accompanied by a sine-like variable magnetic field . The direction of its circulation the magnetic field is perpendicular to the direction of the electric field . The wave equation for magnetic field is:

*=*

1. Which is the equation of the velocity of electromagnetic waves of the vacuum expressed by Maxwell ?

Hints: = Speed of light in the void, = the magnetic constant, = Vaccum permittivity

1. = (ans.)
2. =
3. =
4. =

Ans: =

Prove:

Maxwell's theory suggests that the spread of the electrical and magnetic fields in electromagnetic waves is related to the relationship between and below respectively.

= c

Or, =

Where This equation can also be written as, = .

Besides, Maxwell expresses the velocity of electromagnetic waves in the vacuum by the equation below.

=

1. Top value of magnetic field,

Hints: , c = Speed of light in the void, λ = wavelength

1. (ans.)
2. =
3. =
4. =

Ans:

Prove:

Maxwell's theory suggests that the spread of the electrical and magnetic fields in electromagnetic waves is related to the relationship between and below respectively.

= c

or, =

So,

1. Which is the second formula for refraction?

Hints:

1. aµb = (ans.)
2. aµb =
3. aµb =
4. aµb =

Ans: aµb = s

Prove:

1. Difference in the state of the waves, δ = ?

Hints: Two sources of light =

1. δ = (ans.)
2. δ =
3. δ =
4. δ =

Ans: δ =

Prove:

Suppose, at any time , when the light wave is moving from the to the point for the waves coming from the and for the waves coming from the ,

*y1* = and, *y2* =

Here spread of waves and *S1 P* = *x1* , *S2 P = x2*

The state angle of waves coming from and at *P* point is and respectively.

Therefore, , δ = -

= =

1. State difference δ = π, 3π, 5π, 7π... Etc. Then the path difference = ? (Page: 222 | FIG: 7.8)

Hints λ = wavelength

1. Path difference = λ - (ans.)
2. Path difference = λ
3. Path difference =
4. Path difference =

Ans: Path difference =

Prove:

State difference, δ = π, 3π, 5π, 7π... Etc. π the odd unit of π = whereas = 0, 1, 2, 3 etc.

Means, when, = π. Therefore, path difference =

So, path difference = λ

1. When , then path difference = ?

Hints: λ = wavelength

1. Path difference = (ans.)
2. Path difference = λ
3. Path difference =
4. Path difference =

Ans: Path difference =

Prove:

We know, when state difference δ = π, 3π, 5π, 7π…Etc then path difference = λ

So, when , then path difference = (1 + ) λ = =

1. ব্যতিচারের শর্ত অনুসারে, path difference = ?

Hints: λ = wavelength

1. Path difference = (ans.)
2. Path difference =
3. Path difference =
4. Path difference =

Ans: Path difference =

Prove:

1. Two bright stripes spacing, = ? (Page: 223 | FIG: 7.9)

Hints: λ = wavelength, = Distance from double slit to screen, = Distance between the two slits

1. = λ (ans.)
3. =
4. =

Ans: = λ

Prove:

From figure, in triangle

= [

=

here, ব্যতিচারের শর্ত অনুসারে,

path difference =

So, = … …(i)

again, is very small in triangle so,

= = =

Placing this value on equation (i) , =

therefore, = … …(ii)

Similarly, the distance from to th brightest dora,

… …(iii)

so, distance between the two stripes or two bright stripes spacing,

= = =

So, = λ

1. How many times of the width of a bright or dark stripe is the gap between two dark or bright stripes? (Page: 223 | FIG: 7.10)
2. Half (ans.)
3. Double
4. Reverse half
5. Triple

Ans: Half

Prove:

1. Stripe width, = ?

Hints: λ = wavelength, = Distance from double slit to screen, = Distance between the two slits

1. = (ans.)
2. =
3. =
4. =

Ans: =

Prove:

The width of a bright or dark stripe is half the gap between two dark stripes or two bright stripes.

So, stripe width,

=