NEW STANDARD ACADEMY

Marks: 90

Date : 05-08-24   CLASS : 12TH JEE   Time: 3 HRS

PHYSICS

1. 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   (b) ω^2
   (c) k/ω (d) kω^2

2. Displacement current goes through the gap between the plates of a capacitor when the charge of the capacitor:
   (a) Increases or decreases
   (b) only decreases
   (c) electric energy
   (d) is zero

3. If a source is transmitting electromagnetic wave of frequency 8.2 x 10^6 Hz, then wavelength of the electromagnetic waves transmitted from the source will be
   (a) 36.6 m   (b) 40.5 m
   (c) 42.3 m   (d) 50.9 m

4. 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 x 10^{-6} T   (b) 6 x 10^{-8} T
   (d) 11 x 10^{-9} T   (c) 9 x 10^{-11} T

5. According to Maxwell's hypothesis, a changing electric field gives rise to
   (a) An emf   (b) Electric current
   (c) Magnetic field   (d) Pressure radian

6. The oscillating electric and magnetic vectors of an electromagnetic wave are oriented along
   (a) The same direction but differ in phase by 90°
   (b) The same direction and are in phase
   (c) Mutually perpendicular directions and are in phase
   (d) Mutually perpendicular directions and differ in phase by 90°

7. The dimensions of 1 / $\mu_0\varepsilon_0$ where symbols have their usual meanings, are
   (a) [L^{-1} T]   (b) [L^{-2} T^2]
   (c) [L^{2}T^{-2}]   (d) [L T^{-1}]

8. Which of the following radiations has the least wavelength?
   (a) γrays   (b) β-rays
   (c) α-rays   (d) X-rays

9. The rms value of the electric field of the light coming from sun is 720 N/C. The average energy density of the emf is
   (a) 3.3×10^{-3} J/m^3
   (c) 6.37 ×10^{-9} J /m^3
   (b) 4.58 ×10^{-6}J / m^3
   (d) 81.35 × 10^{-12}J /m^3

10. An electromagnetic wave in vacuum has the electric and magnetic field $\widehat{E}$ and $\hat{B}$ which are always perpendicular to each other. The direction of polarization is given by $\hat{X}$ and that of wave propagation by $\hat{k}$ Then
    (a) $\hat{X} \parallel \hat{B}$ and $\hat{k} \parallel \hat{B} \times \widehat{E}$
    (b) $\hat{X} \parallel \widehat{E}$ and $\hat{k} \parallel \widehat{E} \times \hat{B}$
    (c) $\hat{X} \parallel \hat{B}$ and $\hat{k} \parallel \widehat{E} \times \hat{B}$
    (d) $\hat{X} \parallel \widehat{E}$ and $\hat{k} \parallel \hat{B} \times \widehat{E}$

11. The magnetic field in a travelling electromagnetic wave has a peak value of 20 nT. The peak value of electric field strength is
    (a) 6 V/m   (b) 9 V/m
    (c) 12 V/m   (d) 3 V/m

12. Match List I (Electromagnetic wave type) with List II (Its association/application) and select the correct option from the choices given below the lists:

List I		List II
(p) Infrared waves	(i)	To treat muscular strain
(q) Radio waves	(ii)	For broadcasting
(r) X-rays	(iii)	To detect fracture of bones
	Ultraviolet rays	(iv) Absorbed by the ozone layer of the atmosphere

	p.	q.	r.	s.
(a)	(iii)	(ii)	(i)	(iv)
(b)	(i)	(ii)	(iii)	(iv)
(c)	(iv)	(iii)	(ii)	(i)
(d)	(i)	(ii)	(iv)	(iii)

13. Arrange the following electromagnetic radiations per quantum in the order of increasing energy:
A: Blue light
B: Yellow light
C: X-ray
D: Radiowave
(a) D, B, A, C
(b) A, B, D, C
(c) C, A, B, D
(d) B, A, D, C

14. An observer is moving with half the speed of light towards a stationary microwave source emitting waves at frequency 10 GHz. What is the frequency of the microwave measured by the observer? (Speed of light = 3×10^8 ms^{-1})
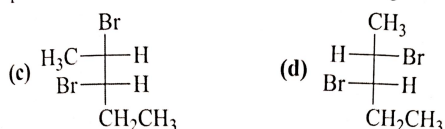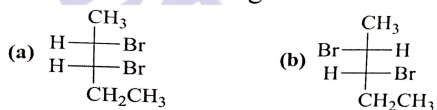(a) 17.3 GHz
(b) 15.3 GHz
(c) 10.1 GHz
(d) 12.1 GHz

15. A parallel plate capacitor has plates of area 0.32 m², which are separated by a distance of 5 mm. the capacitor is raised to a potential of 1200 V. Estimate the average value of displacement current, when it is discharged for 1 μs.
(a) 0.86A
(b) 0.086A
(c) 86A
(d) 0.68A

CHEMISTRY

1. When (S)-2-bromopentane is brominated, several 2,3-dibromopentane are formed, which of the following is not formed

(a)
CH_3
H——Br
H——Br
CH_2CH_3

(b)
CH_3
Br——H
H——Br
CH_2CH_3

(c)
Br
H_3C——H
Br——H
CH_2CH_3

(d)
CH_3
H——Br
Br——H
CH_2CH_3

2. The yield of alkyl bromide obtained as a result of heating the dry silver salt of carboxylic acid with bromide in CCl_4 is
(a) 1° > 3° > 2° bromides
(b) l° > 2° > 3° bromides
(c) 3° > 2° > 1° bromides
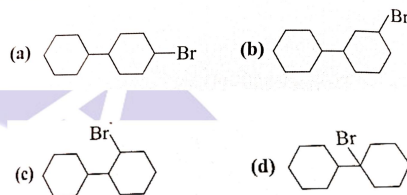(d) 3° > 1° > 2° bromides

3. Which is incorrect about Hynsdiecker's reaction?
(a) Only Cl_2 can give alkyl halide
(b) I_2 will give ester when treated with RCOOAg
(c) The reaction proceeds through free radical
(d) F_2 cannot give alkyl halide

4. The major product of the following reaction is

(a)
(b)
(c)
(d)

5. Racemic mixture is obtained due to the halogenation of
(a) n-pentane
(b) isopentane
(c) neopentane
(d) Both (a) and (b)

6. Which of the following can bring about free radical chlorination of propane?
(a) $SOCl_2$
(b) SO_2Cl_2
(c) Cl_2 / hv
(d) PCl_3

7. The reaction $C_3H_8 + Cl_2 \xrightarrow{Light} C_3H_7Cl + HCl$ is an example of
a) Electrophilic Addition reaction
b) Free readical substitution reaction
c) Oxidation reaction
d) Addition of halogen reaction

8. The product formed in the reaction of HX with $(CH_3)_2C=CH_2$ is
a) $(CH_3)_2CXCH_3$
b) $(CH_3)_2CH.CH_2X$
c) $(CH_3)_2CH=CH_2$
d) $(CH_3)_2CXCH_2X$

9. The typical reaction of alkyl halides is
a) Electrophilic substitution
b) Nucleophilic substitution
c) Electrophilic addition
d) All of the above

10. The reaction $CH_2=CH-CH_3 + HBr \rightarrow CH_3CHBrCH_3$ is an example of
a) Nucleophilic addition
b) Electrophilic addition
c) Electrophilic rearrangement
d) Free redical addition.

11. 1, 4-pentadiene reacts with NBS to form mainly
a) $CH_2 = CH -CH = CH - CH_2 - Br$
b) $CH_2 = CH -CH = CH - CH_2$

Br

c) $CH_2 = CH - CH_2 - CH = CH$ Br

d) None of the above

12. Which of the following is not aryl halide?
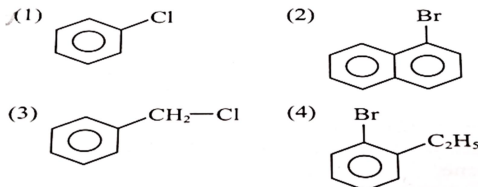
13. In benzyl chloride, halogen bearing carbon is linked to ____ hybridized carbon.
a) sp^3 b) sp^2
c) sp   d) sp^3d

14. How many secondary alkyl chloride are possible form n- pentane?
a) 1   b) 2
c) 3   d) 4

15. IUPAC nomenclature of

$CH = CH - CH_2 - Cl$ is
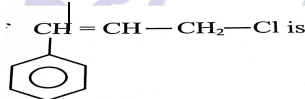
(a) 1-Chloro-3-phenyl prop-2-ene
(b) Cinnamyl chloride
(c) Benzylic chloride
(d) Phenyl allyl chloride

MATHS

1. If the function $f(x) = x^4 - 62x^2 + ax + 9$ is maximum at x=1, then the value of a is
a)   120   b) -120
c)   52   c)   128

2. If $f'(x) = g(x)(x - \lambda)^2$ where $(\lambda) \neq 0$ and $g(x)$ is continuous at $x = \lambda$ then function $f(x)$
a) increasing near to λ if $g(\lambda) > 0$
b) decreasing near to λ if $g(\lambda) > 0$
c) increasing near to λ if $g(\lambda) < 0$
d) increasing near to λ for every value of $g(\lambda)$

3. Function $f(x) = \tan x - 4x$ is decreasing function when
a) $-\pi/2 < x < \pi/3$
b) $-\pi/3 < x < \pi/3$
c) $-\pi/3 < x < \pi/2$
d) None of these

4. If x be real, then the minimum value of $f(x) = 3^{x+1} + 3^{-(x+1)}$ is
a) 2   b) 6
c) 2/3   d) 7/9

5. The interval in which $f(x) = cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ is decreasing is
a) $(-\infty, \infty)$ b)$(-\infty, 0)$
c) $(0, \infty)$ d) None of these

6. $F(x) = sin^p x cos^q x$, (p,q>0, $0 < x < \pi/2$) has point of maxima at
a) $x = tan^{-1}\sqrt{p/q}$
b) $x = tan^{-1}\sqrt{q/p}$
c) no such point exists
d) none of these

7. The global maximum value of $f(x) = log_{10}(4x^3 - 12x^2 + 11x - 3)$, $x \in [2, 3]$ is
a) $-\frac{3}{2} log_{10}3$ b) $1 + log_{10}3$
c) $log_{10}3$ d) $\frac{3}{2} log_{10}3$

8. Let the tangent to the graph of y = f(x) at the point $x = a$ be parallel to x-axis and let $f'(a - h) > 0$ and $f'(a+h) < 0$ where h is a very small +ve quantity. Then the ordinate at x= a is
a) a maximum
b) a minimum
c) both a maximum nor a minimum
d) Neither maximum nor minimum

9. The greatest value of the function $f(x) = tan^{-1}x - \frac{1}{2} log x$ in $\left[\frac{1}{\sqrt{3}}, \sqrt{3}\right]$ is
a) $\frac{\pi}{6} + \frac{1}{4} log 3$ b) $\frac{\pi}{3} - \frac{1}{4} log 3$
c) $\frac{\pi}{6} - \frac{1}{4} log 3$ d) $\frac{\pi}{3} + \frac{1}{4} log 3$

10. If the point (1, 3) serves as the point of inflection of the curve y = $ax^3 + bx^2$ then the values of 'a' and 'b' are
a) a =   3/2 and b = -9/2
b) a = 3/2 and b = 9/2
c) a = - 3/2 and b = -9/2
d) a = - 3/2 and b = 9/2

11. The least positive integral value of a such that $2x + \frac{a}{x^2} \geq 6, \forall x \in R$ is_____

12. Consider real function $f(x)$_____
$= \begin{cases} e^x - 2 - e^{-2}, & x < -2 \\ x^2 - x + \lambda, & -2 \leq x \leq 2 \end{cases}$ If $f(x)$ has local maxima at x = -2, then minimum absolute value of λ is

13. The least integral value of x where $f(x) = log_{1/2}(x^2 - 2x - 3)$ is monotonically decreasing is_____

14. The equation $x^4 - 4x + c = 0$ has no real roots, the minimum integral of c can be_____

15. The least positive integral value of λ for which $(x)=\dfrac{3x^3}{2}+\dfrac{\lambda x^2}{3}+x+7$ has a point of maxma_____