2021-12-19

1.A hollow metal sphere of radius R is uniformly charged. The electric field due to the sphere at a distance r from the centre

Increases as r increases for r < R and for r > R

Zero as r increases for r < R, decreases as r increases for r > R

Zero as r increases for r < R, increases as r increases for r > R

Decreases as r increases for r < R and for r > R

2.Which is the following is used in optical fibres?

total internal reflection

scattering

diffraction

refraction

3.For a projectile, the ratio of maximum height reached to the square of flight time is (g = 10 ms–2)

5 : 1

5 : 2

5 : 4

10 : 1

4.A travelling wave in a stretched string is described by the equation $y = A\sin(kx - \omega t)$. The maximum particle velocity is

$A\omega$

ω/k

$d\omega/dk$

x/t

5.An iron bar of length 10 m is heated from 0°C to 100°C. If the coefficient of linear thermal expansion of iron is 10 * 10–6 /°C, the increase in the length of bar is

0.5 cm

1.0 cm

1.5 cm

2.0 cm

6.A transverse progressive wave on a stretched string has a velocity of $10ms^{-1}$ and a frequency of 100 Hz. The phase difference between two particles of the string which are 2.5 cm apart will be

$\frac{\pi}{8}$

$\frac{\pi}{4}$

$\frac{3\pi}{8}$

$\frac{\pi}{2}$

7.To get three images of a single object, one should have two plane mirrors at an angle of

30°

60°

90°

120°

8.The resultant of $\vec{P}$ and $\vec{Q}$ is perpendicular to $\vec{P}$. What is the angle between $\vec{P}$ and $\vec{Q}$?

$\cos^{-1}(P/Q)$

$\cos^{-1}(-P/Q)$

$\sin^{-1}(P/Q)$

$\sin^{-1}(-P/Q)$

9.A car is moving along a straight horizontal road with a speed v0. If the coefficient of friction between the tyres and the road is μ, the shortest distance in which the car can be stopped is

$\frac{v_0^2}{2\mu g}$

$\frac{v_0}{\mu g}$

$\left(\frac{v_0}{\mu g}\right)^2$

$\frac{v_0}{\mu}$

10.A count rate meter shows a count of 240 per minute from a given radioactive source. One hour later the meter shows a count rate of 30 per minute. The half-life of the source is

120 min

80 min

30 min

20 min

11.A particle is executing simple harmonic motion with a period of T seconds and amplitude a metres . The shortest time it takes to reach a point $\frac{a}{\sqrt{2}}m$ from its mean position in seconds is

T

T /4

T /8

T /16

12.Density of substance at 0°C is 10 gm/cc and at 100°C, its density is 9.7 gm/cc. The coefficient of linear expansion of the substance will be

10-1

10–2

10–3

10–4

13.Which of the following line is a diameter of the circle $x^2 + y^2 - 6x - 8y - 9 = 0$

$3x - 4y = 0$

$4x - 3y = 9$

$x + y = 7$

$x - y = 1$

14.If *A* and *B* are disjoint, then $n(A \cup B)$ is equal to

$n(A)$

$n(B)$

$n(A) + n(B)$

$n(A) \, . \, n(B)$

15.A set X is defined as follows: $X \subset N$
$2 \in X$
$X = \{p : p \mod x \neq 0 \ \forall \ x \in X\}$ The set X is:

set of all odd numbers

set of all prime numbers

set of all natural numbers

none of the above

16. $\int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx =$

$e^{\sqrt{x}}$

$\frac{e^{\sqrt{x}}}{2}$

$2e^{\sqrt{x}}$

$\sqrt{x} \cdot e^{\sqrt{x}}$

17.

$$\lim_{x \to 0} \cos \frac{1}{x}$$

Is continuous at x = 0

Is differentiable at x = 0

doesn't exist

none of these

18.If $f : R \to R$, then the range of the function $f(x) = \frac{x^2}{x^2 + 1}$ is

$\mathbb{R}^-$

$\mathbb{R}^+$

$\mathbb{R}$

$\mathbb{R} \times \mathbb{R}$

19.Period of |sin 2x| + |cos 8x| is:

$\frac{\pi}{4}$

$\frac{\pi}{2}$

$\frac{\pi}{8}$

$\frac{\pi}{16}$

20.The dot product of two vectors $\vec{a}$ and $\vec{b}$ is x and their sum is y. Then, $a^2 + b^2 =$

$x^2 + y^2$

$x^2 - y^2$

$y^2 - x^2$

$y^2 + 2x$

21.If $|a| = 3,\ |b| = 1,\ |c| = 4$ and $a + b + c = 0$, then $a \,.\, b + b \,.\, c + c \,.\, a =$

- 13
- 10

13

10

22.$\frac{d}{dx}(\ln(\sin x + \cos x)) =$

$\sec 2x + \tan 2x$

$\sec 2x \tan 2x$

$\tan 2x - \sec 2x$

$\sec 2x - \tan 2x$

23.The middle term of $\left(x - \frac{1}{x}\right)^5$ is:

0

$10x$

$-10/x$

none of these

24.$\int \cos \sqrt{x} dx =$

$\cos \sqrt{x} + \sqrt{x} \sin \sqrt{x}$

$2(\cos \sqrt{x} + \sqrt{x} \sin \sqrt{x})$

$2(\cos \sqrt{x} + \frac{1}{\sqrt{x}} \sin \sqrt{x})$

$2(\cos \sqrt{x} + \frac{1}{2\sqrt{x}} \sin \sqrt{x})$

25.The equation of pair of tangents to the circle $x^2 + y^2 - 2x + 4y + 3 = 0$ from $(6, -5)$, is

$7x^2 + 23y^2 + 30xy + 66x + 50y - 73 = 0$

$7x^2 + 23y^2 + 30xy - 66x - 50y - 73 = 0$

$7x^2 + 23y^2 - 30xy - 66x - 50y + 73 = 0$

none of these

26.In a triangle ΔABC, $r^2 \cot \frac{A}{2} \cot \frac{B}{2} \cot \frac{C}{2}$ =

Δ

$a^2 + b^2 + c^2$

s^2

none of these

27.The tangent to hyperbola $3x^2 - 4y^2 = 12$ at the point intersected by ordinate $x = 5$ is:

$15x + 6\sqrt{7}y = 12$

$6\sqrt{7}x + 15y = 12$

$15x + 6\sqrt{7}y = -12$

none of these

28.An arithmetic progression has first term double of the common difference. If the fourth term is 5, then the second term is:

1

2

3

4

29.Which one of the following properties of an element is not variable ?

Valency

Atomic weight

Equivalent weight

All of these

30.Calculate the number of moles in $1m^3$ gas at STP.

4.46

44.6

446

4460

31.$\mathrm{HOOC-CH_2-\underset{|COOH}{CH}-CH_2-CH_2-COOH}$

2-(Carboxy methyl)-pentane-1, 5-dioic acid

3-Carboxy hexane -1, 6 -dioic acid

Butane, 1, 2, 4,-Tricarboxylic acid

4-Carboxy hexane-1, 6 dioic acid

32.An ionizing solvent has

Low value of dielectric constant

High value of dielectric constant

A dielectric constant equal to 1

Has a high melting point

33.4 moles of A are mixed with 4 moles of B. At equilibrium for the reaction A+B ⊠ C+D, 2 moles of C and D are formed. The equilibrium constant for the reaction will be

1/4

1/2

1

4

34.0.4g of pure NaOH were added to 50ml of N/2 HCl. The mixture was then diluted to 500ml. The pH of the diluted solution is

0.25

0.52

1.52

2.25

35.Which one of the following pairs of substances when mixed, produces chlorine gas at room temperature ?

NaCl and $\mathrm{MnO_2}$

$NaCl$ and $\mathrm{(conc.)}HNO_3$

$NaCl$ and $\mathrm{(conc.)}H_2SO_4$

$\mathrm{(conc.)}HCl$ and $\mathrm{KMnO_4}$

36.The number of oxygen atoms present in 10.6g of Na_2CO_3 is

6.023 x 10^{22}

12.046 x 10^{22}

1.806 x 10^{23}

6.023 x 10^{23}

37.island

$/'alnd/$

$/'alnd/$

$/'alnd/$

$/'alnd/$

38.Anu remained at home because she had a sore throat.

a simple sentence

a compound sentence

a complex sentence

a compound-complex sentence

39.The word opposite in meaning to ‘embrace’ is:

disguise

complain

reject

obey

40.The …. were washed.

clothing

clothes

cloth

cloths