2021-12-21

1.The frequency of a rod is 200 *Hz*. If the velocity of sound in air is $340\,ms^{-1}$, the wavelength of the sound produced is

1.7 *cm*

6.8 *cm*

1.7 *m*

6.8 *m*

2.If a long hollow copper pipe carries a direct current, the magnetic field associated with the current will be

Only inside the pipe

Only outside the pipe

Neither inside nor outside the pipe

Both inside and outside the pipe

3.A light beam is being reflected by using two mirrors, as in a periscope used in submarines. If one of the mirrors rotates by an angle θ, the reflected light will deviate from its original path by the angle

2θ

0o

θ

4θ

4.Two polaroids are placed in the path of unpolarized beam of intensity I_0 such that no light is emitted from the second polaroid. If a third polaroid whose polarization axis makes an angle θ with the polarization axis of first polaroid, is placed between these polaroids then the intensity of light emerging from the last polaroid will be

$\left(\frac{I_0}{8}\right)\sin^2 2\theta$

$\left(\frac{I_0}{4}\right)\sin^2 2\theta$

$\left(\frac{I_0}{2}\right)\cos^4\theta$

$I_0\cos^4\theta$

5.10 gm of radioactive material of half-life 15 year is kept in store for 20 years. The disintegrated material is

12.5 g

10.5 g

6.03 g

4.03 g

6.A ray of light is incident at 50° on the middle of one of the two mirrors arranged at an angle of 60° between them. The ray then touches the second mirror, get reflected back to the first mirror, making an angle of incidence of

50°

60°

70°

80°

7.A liquid of mass M and specific heat S is at a temperature $2t$. If another liquid of thermal capacity 1.5 times, at a temperature of $\frac{t}{3}$ is added to it, the resultant temperature will be

$\frac{4}{3}t$

$\frac{t}{2}$

$\frac{2}{3}t$

t

8.Two point masses m and 3m are placed at distance r. The moment of inertia of the system about an axis passing through the centre of mass of system and perpendicular to the line joining the point masses is

$\frac{3}{5}mr^2$

$\frac{3}{4}mr^2$

$\frac{3}{2}mr^2$

$\frac{6}{7}mr^2$

9.A body at rest breaks up into 3 parts. If 2 parts having equal masses fly off perpendicularly each after with a velocity of 12m/s, then the velocity of the third part which has 3 times mass of each part is

$4\sqrt{2}\mathrm{m/s}$ at an angle of 45o from each body

$24\sqrt{2}\mathrm{m/s}$ at an angle of 135o from each body

$6\sqrt{2}\mathrm{m/s}$ at 135o from each body

$4\sqrt{2}\mathrm{m/s}$ at 135o from each body

10.A condenser has a capacity $2\mu F$ and is charged to a voltage of 50 V. The energy stored is

25 * 105 Joule

25 Joule

25 * 10 erg

25 * 103 erg

11.A bar of iron is $10\mathrm{cm}$ at $20^{\circ}\mathrm{C}$. At $19^{\circ}\mathrm{C}$ it will be (α of iron $= 11 \times 10^{-6}/^{\circ}C$)

11 * 10–6 cm longer

11 * 10–6 cm shorter

11 * 10–5 cm shorter

11 * 10–5 cm longer

12.Capacitance (in F) of a spherical conductor with radius 1 m is

10^{-3}

10^{-6}

9×10^{-9}

1.1×10^{-10}

13.Which of the following is true?

$\sqrt{1} = \pm 1$

$\sqrt{-1} = \pm i$

$\sqrt{x^2} = x$

$i^2 = -1$

14.If a man and his wife enter in a bus, in which five seats are vacant, then the number of different ways in which they can be seated is :

2

5

20

40

15.If a point x, y satisfies $x = a\cosh t, y = b\sinh t$, then the point lies on :

hyperbola

ellipse

circle

none of these

16.The number of non-empty proper subsets of a set is 30, then the number of elements in the set is

4

5

6

7

17.If the position vectors of A and B are $i + 3j - 7k$ and $5i - 2j + 4k$, then the direction cosine of $\overrightarrow{AB}$ along y-axis is

$\frac{4}{\sqrt{162}}$

$-\frac{5}{\sqrt{162}}$

-5

11

18.The area of a triangle is 18 square units and the perimeter is 12 units. Its inradius is:

3 units

6 units

4 units

9 units

19.If the co-ordinates of A and B be (1, 2, 3) and (7, 8, 7), then the projections of the line segment AB on the co-ordinate axes are:

6, 6, 4

4, 6, 4

3, 3, 2

2, 3, 2

20.The equations $|x| = p, |y| = p, |z| = p$ in xyz space represent:

Cube

Rhombus

Sphere of radius p

Point (p, p, p)

21.At which point on y-axis the line $x = 0$ is a tangent to circle $x^2 + y^2 - 2x - 6y + 9 = 0$

$(0, 1)$

$(0, 2)$

$(0, 3)$

$(0, 4)$

22.If the points (0, 1, 2), (2, -1, 3) and (1, -3, 1) are the vertices of a triangle, then the triangle is

Right angled

Isosceles right angled

Equilateral

None of these

23.The function $f(x) = \begin{cases} x^2 - x & x < 1 \\ 0 & x = 1 \\ x - 1 & x > 1 \end{cases}$ is:

continuous at $x = 1$

differentiable at $x = 1$

neither (a) nor (b)

both (a) and (b)

24.The number which exceeds its positive square root by 12 is :

9

16

25

None of these

25. $\begin{vmatrix} 1+i & 1-i & i \\ 1-i & i & 1+i \\ i & 1+i & 1-i \end{vmatrix} =$

$-4-7i$

$4+7i$

$3+7i$

$7+4i$

26.The slope of the line passing through intersections of $y^2 = 4ax$ and $x^2 = 4ay$ is

1

-1

0

none of the above

27.If $\cos x = \frac{1}{\sqrt{1+t^2}}$ and $\sin y = \frac{t}{\sqrt{1+t^2}}$, then $\frac{dy}{dx} =$

-1

1

$\frac{1-t}{1+t^2}$

$\frac{1}{1+t^2}$

28.The ratio of the sides of triangle ABC is $1 : \sqrt{3} : 2$. The ratio of $A : B : C$ is :

$3 : 5 : 2$

$1 : \sqrt{3} : 2$

3 : 2 : 1

1: 2 : 3

29.The least active halogen with hydrogen is

Cl

I

Br

F

30.When conc.H_2SO_4 comes in contact with sugar, it becomes black due to

Hydrolysis

Hydration

Decolourisation

Dehydration

31.What is the net charge on ferrous ion ?

- 2
- 3
- 4
- 5

32.Chlorine can be manufactured from

Electrolysis of NaCl

Electrolysis of brine

Electrolysis of bleaching powder

All of these

33.The pH of 0.01M HCN solution which is 10% dissocaited is

2

3

4

10

34.On adding solid potassium cyanide to water

pH will increase

pH will decrease

pH will not change

Electrical conductance will not change

35.Find the electric charge in couloumb of $9.0gm$ of Al^{3+} ions.

9.6×10^4

6.9×10^4

2.9×10^5

4.80×10^{-19}

36.The simplest formula of a compound containing 50% of element X (atomic mass 10) and 50% of element Y (atomic mass 20) is

XY

X_2Y

XY_3

X_2Y_3

37.A pair of slippers_____ missing.

are

has

were

is

38.Everybody ___ by the terrible news yesterday.

shocked

were shocked

be shocked

was shocked.

39.They go to work … car, but sometimes they prefer to walk.

by

in

on

with

40.The producer and director _____ coming.

is

are

have been

were