
2022-01-15

1. An electric bulb illuminates a plane surface. The intensity of illumination on the surface at a point $2m$ away from the bulb is 5×10^{-4} phot (lumen/cm²). The line joining the bulb to the point makes an angle of 60° with the normal to the surface. The intensity of the bulb in candela is

$40\sqrt{3}$

40

20

40×10^{-4}

2. A single slit of width a is illuminated by violet light of wavelength 400 nm and the width of the diffraction pattern is measured as y . When half of the slit width is covered and illuminated by yellow light of wavelength 600 nm , the width of the diffraction pattern is

The pattern vanishes and the width is zero

$y/3$

$3y$

None of these

3. The correct relation is

$$B = \frac{B_V}{B_H}$$

$$B = B_V \times B_H$$

$$|B| = \sqrt{B_H^2 + B_V^2}$$

$$B = B_H + B_V$$

4. Two thin lenses, one of focal length $+60 \text{ cm}$ and the other of focal length -20 cm are put in contact. The combined focal length is

- 15 cm
- 15 cm
- 30 cm

-30 cm

5. When forces F_1, F_2, F_3 are acting on a particle of mass m such that F_2 and F_3 are mutually perpendicular, then the particle remains stationary. If the force F_1 is now removed then the acceleration of the particle is

$$F_1/m$$

$$F_2F_3/mF_1$$

$$(F_2 - F_3)/m$$

$$F_2/m$$

6. F_g and F_e represents gravitational and electrostatic force respectively between electrons situated at a distance 10cm. The ratio of F_g/F_e is of the order of

$$1$$

$$10$$

$$10^{42}$$

$$10^{-43}$$

7. The capacitance of a parallel plate capacitor is $12\mu F$. If the distance between the plates is doubled and area is halved, then new capacitance will be

$$3\mu F$$

$$4\mu F$$

$$6\mu F$$

$$8\mu F$$

8. In Millikan's oil drop experiment, an oil drop of mass $16 \times 10^{-6} kg$ is balanced by an electric field of $10^6 V/m$. The charge in coulomb on the drop, assuming $g = 10 m/s^2$ is

$$12 \times 10^{-9}$$

$$16 \times 10^{-9}$$

$$12 \times 10^{-11}$$

$$16 \times 10^{-11}$$

9. A body weighs 200 N on the surface of the earth. How much will it weigh half way down to the centre of the earth ?

$$150 \text{ N}$$

$$200 \text{ N}$$

$$250 \text{ N}$$

$$100 \text{ N}$$

10. Starting with a sample of pure ^{66}Cu , $\frac{7}{9}$ of it decays into Zn in 15 min. The corresponding half-life is

5 min

7.5 min

10 min

15 min

11. In the adjoining circuit, the battery E_1 has an e.m.f of 12 volt and zero internal resistance while the battery E has an e.m.f. of 2 volt. If the galvanometer G reads zero, then the value of the resistance X in ohm is

10

100

200

500

12. The primary winding of a transformer has 100 turns and its secondary winding has 200 turns. The primary is connected to an ac supply of 120 V and the current flowing in it is 10 A. The voltage and the current in the secondary are

240 V, 5 A

240 V, 10 A

60 V, 20 A

120 V, 20 A

13. If a line makes the angle α, β, γ with three dimensional co-ordinate axes respectively, then $\cos 2\alpha + \cos 2\beta + \cos 2\gamma =$

-2

-1

1

2

14. If 1, a and 2 are in HP, then the value of a is:

$\frac{3}{4}$

$\frac{2}{3}$

$\frac{4}{3}$

none of these

15. The equation of the straight line passing through the point (3, 2) and perpendicular to the line $y = x$ is :

$x - y = 5$

$x + y = 5$

$x + y = 1$

$x - y = 1$

16. For specifying a straight line how many geometrical parameters should be known?

1

2

3

4

17. If A , B and C are any three sets, then $A \times (B \cup C)$ is equal to

$(A \times B) \cup (A \times C)$

$(A \cup B) \times (A \cup C)$

$(A \times B) \cap (A \times C)$

None of these

18. If $\tan^{-1} x + 2 \cot^{-1} x = \frac{2\pi}{3}$, then $x =$

$\sqrt{2}$

3

$\sqrt{3}$

$\frac{\sqrt{3} - 1}{\sqrt{3} + 1}$

19. 20 teachers of a school either teach mathematics or physics. 12 of them teach mathematics while 4 teach both the subjects. Then the number of teachers teaching physics only is

12

8

16

None of these

20. The series $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \dots$ evaluates to:

e^2

$\ln 2$

$\ln(1/2)$

none of these

21. $\cos \left[\tan^{-1} \left(\frac{1}{3} \right) + \tan^{-1} \left(\frac{1}{2} \right) \right] =$

$\frac{1}{\sqrt{2}}$

$\frac{\sqrt{3}}{2}$

$\frac{1}{2}$

$\frac{\pi}{4}$

22. The radius of a sphere is measured to be 20 cm with a possible error of 0.02 of a cm. The consequent error in the surface of the sphere is

10.5 sq cm

5.025 sq cm

10.05 sq cm

None of these

23. A curve is described by $y = \cos(ax) + a \sin x$. The equation of normal at $x = 0$ is:

$ax + y = a$

$ay + x = a$

$ax - y = a$

$ay - x = a$

24. The point of the curve $y^2 = 2(x - 3)$ at which the normal is parallel to the line $y - 2x + 1 = 0$ is

(5, 2)

$\left(-\frac{1}{2}, -2 \right)$

$(5, -2)$

$\left(\frac{3}{2}, 2\right)$

25. The range of $f(x) = \sin^3 x - \cos^3 x$ is:

$\left[-\frac{1}{3}, \frac{1}{3}\right]$

$[-1, 1]$

$[-\sqrt{2}, \sqrt{2}]$

none of these

26. If $y = \cosh x - \sinh x$ then $\frac{dx}{dy} =$

y

$-y$

$1/y$

$-1/y$

27.

$$\lim_{x \rightarrow a} \frac{\cos x - \cos a}{\cot x - \cot a} =$$

$\frac{1}{2} \sin^3 a$

$\frac{1}{2} \operatorname{cosec}^2 a$

$\sin^3 a$

$\operatorname{cosec}^3 a$

28.

$$\lim_{x \rightarrow 0} \frac{\sin x - x}{x^3} =$$

$1/3$

$-1/3$

$1/6$

$-1/6$

29. Three faradays electricity was passed through an aqueous solution of iron (II) bromide. The weight of iron metal (at. wt. = 56) deposited at the cathode (in gm) is

56

84

112

168

30. For a given value of quantum number l , the number of allowed values of m is given by

$l + 2$

$2l + 2$

$2l + 1$

$l + 1$

31. Brass is an alloy of copper and _____

Zinc

Tin

Tin and iron

Nickel

32. What is the maximum number of hydrogen bonds in which a water molecule can participate?

1

2

3

4

33. Sodium hydroxide reacts with chlorine gas in hot condition to give

$NaCl$

$NaClO$

$NaClO_3$

$NaClO_3 + NaCl$

34. The mass of $BaCO_3$ produced when excess CO_2 is bubbled through a solution of 0.205 mol $Ba(OH)_2$ is

81g

40.5g

20.25g

162g

35. Which of the following compound is formed when a gas obtained by reacting H_2SO_4 with excess of P_4O_{10} is treated with anhydrous HCl ?

Chlorosulphonic acid

Hypochlorous acid

Sulphur

Phosphine

36. What is the minimum concentration of SO_4^{2-} required to precipitate $BaSO_4$ in a solution containing $1.0 \times 10^{-4} \text{ mol } Ba^{2+}$? (K_{sp} for $BaSO_4$ is 4×10^{-10})

$4 \times 10^{-10} M$

$2 \times 10^{-7} M$

$4 \times 10^{-6} M$

$2 \times 10^{-3} M$

37. Yesterday was not a nice day. It ____ since morning.

was raining

has been raining

had been raining

rained

38. "Yoga is a science." Pragyan said to Nikita. The reported speech for the above sentence is:

Pragyan told Nikita that yoga was a science.

Pragyan told Nikita that yoga had been a science.

Pragyan told Nikita that yoga is a science.

Pragyan tells Nikita that yoga is a science.

39. She couldn't notice me ----- in.

came

to come

come

coming

40.Which syllable is stressed in the word 'question'?

first

second

third

fourth