2022-01-06

1.The force constant of a wire is k and that of another wire is 2k. When both the wires are stretched through same distance, then the work done

W2 = 2W12

W2 = 2W1

W2 = W1

W2 = 0.5W1

2.Consider the acceleration, velocity and displacement of a tennis ball as it falls to the ground and bounces back. Directions of which of these changes in the process are

Velocity only

Displacement and velocity

Acceleration, velocity and displacement

Displacement and acceleration

3.An astronomical telescope has objective and eye-piece lens of powers 0.5 *D* and 20 *D* respectively, its magnifying power will be

8

20

30

40

4.Unit of magnetic flux density (or magnetic induction) is

Tesla

Weber/metre2

Newton/ampere-metre

All of the above

5.Two identical photocathodes receive light of frequencies f_1 and f_2. If the velocities of the photoelectrons (of mass m) coming out are respectively v_1 and v_2, then

$v_1^2 - v_2^2 = \frac{2h}{m}(f_1 - f_2)$

$v_1 + v_2 = \left[\frac{2h}{m}(f_1 + f_2)\right]^{\frac{1}{2}}$

$v_1^2 + v_2^2 = \frac{2h}{m}(f_1 + f_2)$

$v_1 - v_2 = \left[\frac{2h}{m}(f_1 - f_2)\right]^{\frac{1}{2}}$

6.Water falls from a height of 210m. Assuming whole of energy due to fall is converted into heat the rise in temperature of water would be (J = 4.3 Joule/cal)

42°C

49°C

0.49°C

4.9°C

7.The amplitude and the periodic time of a S.H.M. are 5 *cm* and 6 *sec* respectively. At a distance of 2.5 *cm* away from the mean position, the phase will be

$5\pi/12$

$\pi/4$

$\pi/3$

$\pi/6$

8.The real coefficient of volume expansion of glycerine is 0.000597 per°C and linear coefficient of expansion of glass is 0.000009 per°C. Then the apparent volume coefficient of expansion of glycerine is

0.000558 per °C

0.00057 per °C

0.00027 per °C

0.00066 per °C

9.A circular disc of mass 2 kg and radius 10 cm rolls without slipping with a speed 2 m/s. The total kinetic energy of disc is

10 J

6 J

2 J

4 J

10.When a metal surface is illuminated by light of wavelengths 400 nm and 250 nm, the maximum velocities of the photoelectrons ejected are v and 2v respectively. The work function of the metal is (h = Planck's constant, c = velocity of light in air)

$2hc \times 10^6 J$

$1.5hc \times 10^6 J$

$hc \times 10^6 J$

$0.5hc \times 10^6 J$

11.The peak value of an alternating e.m.f. E is given by $E = E_0 \cos \omega t$ is 10 volts and its frequency is 50 Hz. At time $t = \frac{1}{600} sec$, the instantaneous e.m.f. is

$10V$

$5\sqrt{3}V$

$5V$

$1V$

12.If pressure of a gas contained in a closed vessel is increased by 0.4 $\%$ when heated by $1^\circ C$, the initial temperature must be

250 K

250$^\circ C$

2500 K

25$^\circ C$

13.If A is any set, then

$A \bigcup A' = \phi$

$A \bigcup A' = U$

$A \bigcap A' = U$

None of these

14.If the given planes $ax + by + cz + d = 0$ and $a'x + b'y + c'z + d' = 0$ be mutually perpendicular, then

$\frac{a}{a'} = \frac{b}{b'} = \frac{c}{c'}$

$\frac{a}{a'} + \frac{b}{b'} + \frac{c}{c'} = 0$

$aa' + bb' + cc' + dd' = 0$

$aa' + bb' + cc' = 0$

15.The equation of a line through the intersection of lines x=0 and y=0 and through the point (2, 2), is

$y = x - 1$

$y = -x$

$y = x$

$y = -x + 2$

16.The sum of the series $\frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - .....$ is

e

$e^{-\frac{1}{2}}$

e^{-2}

None of these

17.In how many ways can 5 boys and 3 girls sit in a row so that no two girls are together ?

$5! \times 3!$

${}^4P_3 \times 5!$

${}^6P_3 \times 5!$

${}^5P_3 \times 3!$

18.L-Hopital's rule is not applicable to evaluate the limit $\lim_{x \to 0} \frac{x}{|x|}$ because:

$f(x) = x$ is not differentiable at $x = 0$

$f(x) = x$ is not defined at $x = 0$

$f(x) = |x|$ is not differentiable at $x = 0$

$f(x) = x$ is not defined at $x = 0$

19.Distance between the points (1, 3, 2) and (2, 1, 3) is:

12

$\sqrt{12}$

$\sqrt{6}$

6

20.Let *A* and *B* be two sets. Then

$A \cup B \subseteq A \cap B$

$A \cap B \subseteq A \cup B$

$A \cap B = A \cup B$

None of these

21.If $\int (\sin 2x - \cos 2x)dx = \frac{1}{\sqrt{2}}\sin(2x - a) + b$, then

$a = \frac{\pi}{4}, b = 0$

$a = -\frac{\pi}{4}, b = 0$

$a = \frac{5\pi}{4}, b =$ any constant

$a = \frac{-5\pi}{4}, b =$ any constant

22.The equation $2x^2 + 4xy - py^2 + 4x + qy + 1 = 0$ will represent two mutually perpendicular straight lines, if

$p = 1$ and $q = 2$ or 6

$p = 2$ and $q = 0$ or 6

$p = 2$ and $q = 0$ or 8

$p = -2$ and $q = -2$ or 8

23. $\begin{vmatrix} x+1 & x+2 & x+4 \\ x+3 & x+5 & x+8 \\ x+7 & x+10 & x+14 \end{vmatrix} =$

2

-2

$x^2 - 2$

none of these

24. $\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} =$

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

$(a + b)(b + c)(c + a)$

$(a - b)(b - c)(c - a)$

none of these

25.A line L is perpendicular to the line $5x - y = 1$ and the area of the triangle formed by the line L and coordinate axes is 5. The equation of the line L is :

$x + 5y = 5$

$x + 5y = \pm 5\sqrt{2}$

$x - 5y = 5$

$x - 5y = 5\sqrt{2}$

26.The equation of tangent at $(-4, -4)$ on the curve $x^2 = -4y$ is

2 x + y + 4 = 0

2 x - y - 12 = 0

2 x + y - 4 = 0

2 x - y + 4 = 0

27.In the expansion of $\left(\frac{a}{x} + bx\right)^{12}$,the coefficient of x^{-10} will be

$12a^{11}$

$12b^{11}a$

$12a^{11}b$

$12a^{11}b^{11}$

28.The locus of the middle points of chords of the circle $x^2 + y^2 - 2x - 6y - 10 = 0$ which passes through the origin, is

$x^2 + y^2 + x + 3y = 0$

$x^2 + y^2 - x + 3y = 0$

$x^2 + y^2 + x - 3y = 0$

$x^2 + y^2 - x - 3y = 0$

29.Which of the following is the best scientific method to test the presence of water in a liquid ?

Use of anhydrous copper sulphate

Use of litmus paper

Taste

Smell

30.Ionic compounds are formed most easily with

Low electron affinity, high ionisation energy

High electron affinity, low ionisation energy

Low electron affinity, low ionisation energy

High electron affinity, high ionisation energy

31.When a piece of wire of copper is dipped in $AgNO_3$ solution, the color of the solution turns blue due to

Formation of soluble complex

Oxidation of copper

Oxidation of silver

Reduction of copper

32.Oxidation number of P in KH_2PO_2 is

- 1
- 3
- 5

-4

33.The sulphate of a metal M contains 9.87% of *M* . This sulphate is isomorphous with $ZnSO_4.7H_2O$. The atomic weight of *M* is

40.3

36.3

24.3

11.3

34.pH of human blood is 7.4. Then concentration will be

4×10^{-8}

2×10^{-8}

4×10^{-4}

2×10^{-4}

35.The product(s) obtained via oxymercuration $(HgSO_4 + H_2SO_4)$ of 1-butyne would be

$CH_3 - CH_2 - CO - CH_3$

$CH_3 - CH_2 - CH_2 - CHO$

$CH_3 - CH_2 - CHO + HCHO$

$CH_3CH_2COOH + HCOOH$

36. The vapor density of metal chloride is 59.5 and the specific heat capacity of the metal is 0.13. Find the equivalent weight of the metal.

9

12

24.5

49

37.Choose the right sentence.

No sooner had they opened the hotel, then they opened a resort.

No sooner they had opened the hotel, then they opened a resort.

No sooner they had opened the hotel, than they opened a resort.

No sooner had they opened the hotel, than they opened a resort.

38.Smoking _____injurious to health.

was

will be

is

had been

39.The boy's face wore a ____ look.

sullener

sully

sullen

more sully

40.We’d be terribly offended if he_____

didn’t come

hadn’t have come

wouldn’t come

wouldn’t have come