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1.A virtual image larger than the object can be obtained by

Concave mirror

Convex mirror

Plane mirror

Concave lens

2.If mass energy equivalence is taken into account, when water is cooled to form ice, the mass of water should

Increase

Remain unchanged

Decrease

First increase then decrease

3.A particle starts from rest, accelerates at 2 m/s2 for 10s and then goes for constant speed for 30s and then decelerates at 4 m/s2 till it stops. What is the distance travelled by it?

700 m

750 m

800 m

850 m

4.The unit of inductance is

Volt/Ampere

Joule/Ampere

(Volt × sec)/Ampere

(Volt × Ampere)/sec

5.Two capillary of length L and 2L and of radius R and 2R are connected in series. The net rate of flow of fluid through them will be (given rate of the flow through single capillary, $X = \pi PR^4/8\eta L$)

$\frac{8}{9}X$

$\frac{9}{8}X$

$\frac{5}{7}X$

$\frac{7}{5}X$

6.The wavelength is 120 *cm* when the source is stationary. If the source is moving with relative velocity of 60 *m*/*sec* towards the observer, then the wavelength of the sound wave reaching to the observer will be (velocity of sound = 330 *m*/*s*)

98 *cm*

140 *cm*

120 *cm*

144 *cm*

7.If the increase in the kinetic energy of a body is 22%, then the increase in the momentum will be

22%

44%

10%

300%

8.A Carnot's engine used first an ideal monoatomic gas then an ideal diatomic gas. If the source and sink temperature are 411^oC and 69^oC respectively and the engine extracts 1000 *J* of heat in each cycle, then area enclosed by the *PV* diagram is

100 *J*

300 *J*

500 *J*

700 *J*

9.A force $\vec{F} = (2\hat{i} + 3\hat{j} - 5\hat{k})$ N acts at a point $\vec{r}_1 = (2\hat{i} + 4\hat{j} + 7\hat{k})$ m. The torque of the force about the point $\vec{r}_2 = (\hat{i} + 2\hat{j} + 3\hat{k})$ m is

$(17\hat{j} + 5\hat{k} - 3\hat{i})$ Nm

$(2\hat{j} + 4\hat{k} - 6\hat{i})$ Nm

$(12\hat{j} - 5\hat{k} + 7\hat{i})$ Nm

$(-22\hat{i} + 13\hat{j} - \hat{k})$ Nm

10.A body of mass moving with a velocity 3 ms–1 collides with another body at rest of mass After collision the velocities of the two bodies are 2 ms–1 and 5ms–1 respectively along the direction of motion of The ratio is

5/12

5

1/5

12/5

11.The refractive index of the material of a prism is 2 and the angle of the prism is 30°. One of the two refracting surfaces of the prism is made a mirror inwards, by silver coating. A beam of monochromatic light entering the prism from the other face will retrace its path (after reflection from the silvered surface) if its angle of incidence on the prism is

30°

45°

60°

Zero

12.Mean life of a radioactive sample is 100 seconds. Then its half life (in minutes) is

0.693

1

1.155

1.414

13.The function which is twice its inverse is:

$f(x) = 2x$

$f(x) = \frac{x}{2}$

$f(x) = \frac{x}{\sqrt{2}}$

$f(x) = \sqrt{2}x$

14.If the position vectors of the vertices of a triangle be $6i + 4j + 5k,\ \ 4i + 5j + 6k$ and $5i + 6j + 4k,$ then the triangle is

Right angled

Isosceles

Equilateral

None of these

15.The equation of a hyperbola is $x^2 - 2y^2 = 1$. What is the ellipse bounded by the vertices of this hyperbola and its conjugate?

$x^2 + 2y^2 = 1$

$2x^2 + y^2 = 1$

$2x^2 + y^2 = 2$

none of these

16.In order that the function $f(x) = (x+1)^{1/x}$ is continuous at $x = 0, f(0)$ must be defined as

$f(0) = 0$

$f(0) = e$

$f(0) = 1/e$

$f(0) = 1$

17.$\int 5 \sin x dx =$

$5 \cos x + c$

$-5 \cos x + c$

$-5 \sin x + c$

$5 \sin x + c$

18.The line joining the points $(-2,\ 1,\ -8)$ and $(a,\ b,\ c)$ is parallel to the line whose direction ratios are 6, 2, 3. The values of a, b, c are

4, 3, -5

1, 2, -13/2

10, 5, -2

None of these

19.

$$\lim_{x \to a} f(x) \cdot g(x)$$

exists if :

$$\lim_{x \to a} f(x)$$

and

$$\lim_{x \to a} g(x)$$

exist

$$\lim_{x \to a} f(x)^{g(x)}$$

exists

$$\lim_{x \to a} \frac{f(x)}{g(x)}$$

exists

$$\lim_{x \to a} f(x) g\left(\frac{1}{x}\right)$$

exists

20.

$$\int_a^b \frac{d}{dx}(x)dx =$$

$$\frac{d}{dx}\int_a^b (x)dx$$

$$\frac{d}{dx}\int (x)dx$$

$$\lim_{x \to b-a} \frac{d}{dx}\int_a^b (x)dx$$

all of these

21.A point *P* moves in *xy*-plane in such a way that $[|x|]+[|y|] = 1$ where [.] denotes the greatest integer function. Area of the region representing all possible positions of the point *P* is equal to

4 sq. units

16 sq. units

$2\sqrt{2}$ sq. units

8 sq. units.

22.The maximum value of the function $x^3 + x^2 + x - 4$ is

127

4

Does not have a maximum value

None of these

23.The radius of circle whose center is collinear with centers of and is tangent to the circles $x^2+y^2 = 4$ and $x^2 + y^2 - 6x - 8y + 24 = 0$ is:

1

2

3

all of the above

24.For $|a|, |b|, |c| \geq 1$, If $\tan^{-1} a + \tan^{-1} b + \tan^{-1} c = \pi$ and a, b, c are in AP, then which of the following is a GP?

$a, \tan(\pi/3), c$

$a, \tan(\pi/6), c$

$a, \tan(\pi/4), c$

a, b, c

25.The equations of the sides of a triangle are $x + y - 5 = 0, x - y + 1 = 0$ and $y - 1 = 0$ then the coordinates of the circumcentre are:

(2,1)

(1,2)

(2,–2)

(1, –2)

26.The area between the curves $y = x^2$ and $y = 2 - x^2$ is:

$4/3$

$8/3$

4

none of these

27.Domain of $e^{\sqrt{5x-3-2x^2}}$ is

$\left[1, -\frac{3}{2}\right]$

$\left[\frac{3}{2}, \infty\right]$

$[-\infty, 1]$

$\left[1, \frac{3}{2}\right]$

28.For $x < a$, $\int \frac{1}{x^2 - a^2} dx =$

$\frac{1}{2a} \ln \left(\frac{a+x}{a-x}\right)$

$\frac{1}{2a} \ln \left(\frac{x+a}{x-a}\right)$

$\frac{1}{2a} \ln \left(\frac{a-x}{a+x}\right)$

$\frac{1}{2a} \ln \left(\frac{x-a}{x+a}\right)$

29.Resonating structures have different

Atomic arrangements

Electronic arrangements

Functional groups

Alkyl groups

30.IUPAC name of $CH_3 - O - C_2H_5$ is

Ethoxymethane

Methoxyethane

Methylethyl ether

Ethylmethyl ether

31.Sulphuric acid reacts with PCl_5 to give

Thionyl chloride

Sulphur monochloride

Sulphuryl chloride

Sulphur tetrachloride

32.Magnesium reacts with an element (X) to form an ionic compound. If the ground state electronic configuration of (X) is 1s2 2s2 2p3, the simplest formula for this compound is

$\mathrm{Mg_2X}$

$\mathrm{MgX_2}$

$\mathrm{Mg_2X_3}$

$\mathrm{Mg_3X_2}$

33.The product of acid catalysed hydration of 2-phenylpropene is

2-phenyl-1-propanol

2-phenyl-2-propanol

1-phenyl-2-propanol

3-phenyl-3-propanol

34.Equivalent weight of a bivalent metal is 37.2. The molecular weight of its chloride is

412.2

216

145.4

108.2

35.The products of reaction of copper and dilute nitric acid are:

$Cu(NO_3)_2 + NO_3 + H_2O$

$Cu(NO_3)_2 + NO + H_2O$

$Cu(NO_3)_2 + NO_2 + H_2O$

$Cu(NO_3)_2 + N_2O + H_2O$

36.What is the minimum concentration of SO_4^{2-} required to precipitate $BaSO_4$ in a solution containing $1.0 \times 10^{-4} mol\ \ Ba^{2+}$? (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.Choose the right sentence.

She had no sooner climed the tree, than he sang.

She had no sooner climed the tree, then he sang.

No sooner had she climed the tree, than he sang.

Both ‘a’ and ‘c’.

38.The synonym of ‘loot’ is:

destruction

waste

spoils

cavort

39.I dare sing, ……...?

daren’t I

dare I

do I

did I

40.’I like sugarcane.’

So am I.

So do I.

Neither am I.

Neither do I.