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2022-01-04

1.The  $x$  and  $y$  coordinates of a particle at any time  $t$  are given by  $x = 7t + 4t^2$  and  $y = 5t$ , where  $x$  and  $y$  are in metre and  $t$  in seconds. The acceleration of particle at  $t = 5s$  is

0

$8m/s^2$

$20m/s^2$

$40m/s^2$

2.Four wires of equal length and of resistances 10 ohms each are connected in the form of a square. The equivalent resistance between two opposite corners of the square is

10 ohm

20 ohm

40 ohm

2.5 ohm

3.The work function of a metal is

The energy for the electron to enter into the metal

The energy for producing X-ray

The energy for the electron to come out from metal surface

None of these

4.The image distance of an object placed 10 cm in front of a thin lens of focal length + 5 cm is

6.5 cm

8.0 cm

9.5 cm

10.0 cm

5.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

$T$

$T/4$

$T/8$

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$T/16$

6. Two-point charges  $+8q$  and  $-2q$  are located at  $x = 0$  and  $x = L$  respectively. The location of a point on the  $x$ -axis at which the net electric field due to these two-point charges is zero is

$8L$

$4L$

$2L$

$\frac{L}{4}$

7. A ball is dropped from a height  $h$ . If the coefficient of restitution be  $e$ , then to what height will it rise after jumping twice from the ground

$eh/2$

$2eh$

$eh$

$e^4h$

8. In Millikan oil drop experiment, a charged drop of mass  $1.8 \times 10^{-14}$  kg is stationary between its plates. The distance between its plates is 0.90 cm and potential difference is 2.0 kilo volts. The number of electrons on the drop is

5

6

7

8

9. A neutron having mass of  $1.67 \times 10^{-27}$  kg and moving at 108 m/s collides with a deuteron at rest and sticks to it. If the mass of the deuteron is  $3.34 \times 10^{-27}$  kg then the speed of the combination is

$2.56 \times 10^3$  m/s

$2.98 \times 10^5$  m/s

$3.33 \times 10^7$  m/s

$5.01 \times 10^9$  m/s

10. A charged particle is suspended in equilibrium in a uniform vertical electric field of intensity 20000 V/m. If mass of the particle is  $9.6 \times 10^{-16}$  kg, the charge on it and excess number of electrons on the particle are respectively ( $g = 10 \text{ m/s}^2$ )

$4.8 \times 10^{-19}$  C, 3

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$$5.8 \times 10^{-19}C, 4$$

$$3.8 \times 10^{-19}C, 2$$

$$2.8 \times 10^{-19}C, 1$$

11. A boat carrying steel balls is floating on the surface of water in a tank. If the balls are thrown into the tank one by one, how will it affect the level of water

It will remain unchanged

It will rise

It will fall

First it will first rise and then fall

12. Two identical cylindrical vessels with their bases at same level each contains a liquid of density  $\rho$ . The height of the liquid in one vessel is  $h_1$  and that in the other vessel is  $h_2$ . The area of either base is  $A$ . The work done by gravity in equalizing the levels when the two vessels are connected, is

$$(h_1 - h_2) g \rho$$

$$(h_1 - h_2) g A \rho$$

$$\frac{1}{2} (h_1 - h_2)^2 g A \rho$$

$$\frac{1}{4} (h_1 - h_2)^2 g A \rho$$

13. If  $\mathbf{a}$ ,  $\mathbf{b}$ ,  $\mathbf{c}$  are three vectors such that  $\mathbf{a} = \mathbf{b} + \mathbf{c}$  and the angle between  $\mathbf{b}$  and  $\mathbf{c}$  is  $\pi/2$ , then

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

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

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

$$2a^2 - b^2 = c^2$$

14. The intersection of two lines represented by  $(x - 1)^2 - (y + 2)^2 + 2(x - 1)(y + 2) = 0$  is:

$$(0, 0)$$

$$(-1, 2)$$

$$(1, -2)$$

none of these

15. The vectors  $\mathbf{a}$ ,  $\mathbf{b}$  and  $\mathbf{a} + \mathbf{b}$  are

Collinear

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Coplanar

Non-coplanar

None of these

16. A bag contains 5 red and 6 blue balls. The number of ways to choose 8 balls is:

165

426

336

none of the above

17.

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

Is continuous at  $x = 0$

Is differentiable at  $x = 0$

doesn't exist

none of these

18. The roots of equation  $x^2 + 2xi - 1 = 0$  are:

real and distinct

complex and distinct

real but identical

complex but identical

19. The area bounded by  $y = \log x$ , the ordinates  $y = 0$ ,  $y = 2$  and  $y$  axis is :

$$e^2 - e$$

$$e^2 - 2$$

$$e^2 - 1$$

$$e^2 - 2e$$

20. Unit vector in the direction of  $2i - 2j + k$  is:

$$\frac{2}{3}i - \frac{2}{3}j + \frac{1}{3}k$$

$$-\frac{2}{3}i + \frac{2}{3}j - \frac{1}{3}k$$

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both (a) and (b)

none of the above

21. The equations of tangents to the circle  $x^2 + y^2 - 22x - 4y + 25 = 0$  which are perpendicular to the line  $5x + 12y + 8 = 0$  are

$12x - 5y + 8 = 0, 12x - 5y = 252$

$12x - 5y = 0, 12x - 5y = 252$

$12x - 5y - 8 = 0, 12x - 5y + 252 = 0$

none of these

22. For,  $|x| < 1$ , the infinite series  $1 - 2x + 3x^2 - 4x^3 + \dots$  evaluates to:

$\frac{1}{1+x}$

$\frac{1}{1-x}$

$\frac{1}{(1+x)^2}$

$\frac{1}{(1-x)^2}$

23. A circle passes through  $(0, 0)$  and  $(1, 0)$  and touches the circle  $x^2 + y^2 = 9$ , then the centre of circle is:

$\left(\frac{3}{2}, \frac{1}{2}\right)$

$\left(\frac{1}{2}, \frac{3}{2}\right)$

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

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

24. The equation of the plane which bisects the line joining  $(2, 3, 4)$  and  $(6, 7, 8)$  is :

$x + y + z - 15 = 0$

$x - y + z - 15 = 0$

$x - y - z - 15 = 0$

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$$x + y + z + 15 = 0$$

25. If  $\lim_{x \rightarrow 2} \frac{x^n - 2^n}{x - 2} = 80$ , where  $n$  is a positive integer, then  $n =$

3

5

2

none of these

26. The greatest coefficient in the expansion of  $(1 + x)^{2n+2}$  is

$$\frac{(2n)!}{(n!)^2}$$

$$\frac{(2n+2)!}{\{(n+1)!\}^2}$$

$$\frac{(2n+2)!}{n!(n+1)!}$$

$$\frac{(2n)!}{n!(n+1)!}$$

27. If  $x\sqrt{1+y} + y\sqrt{1+x} = 0$ , then  $\frac{dy}{dx} =$

$$1 + x$$

$$(1 + x)^{-2}$$

$$-(1 + x)^{-1}$$

$$-(1 + x)^{-2}$$

28.  $r^{th}$  term in the expansion of  $(a + 2x)^n$  is

$$\frac{n(n+1) \dots (n-r+1)}{r!} a^{n-r+1} (2x)^r$$

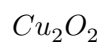
$$\frac{n(n-1) \dots (n-r+2)}{(r-1)!} a^{n-r+1} (2x)^{r-1}$$

$$\frac{n(n+1) \dots (n-r)}{(r+1)!} a^{n-r} (x)^r$$

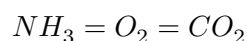
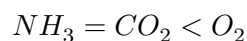
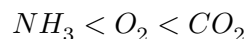
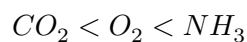
None of these

29. If an extremely hot copper wire is subjected to steam, the product formed is:

CuO



30. The number of molecules in 100 mL of each of  $O_2$ ,  $NH_3$  and  $CO_2$  at STP are



31. In the cell  $Zn | Zn^{2+} || Cu^{2+} | Cu$ , the negative electrode is



32. The correct structure of benzene was proposed by

Faraday

Davy

Kekule

Wohler

33. pH values of HCl and NaOH solutions each of strength  $\frac{N}{100}$  will be respectively

2 and 2

2 and 12

12 and 2

2 and 10

34. At  $25^\circ C$ , the solubility product of  $Mg(OH)_2$  is  $1.0 \times 10^{-11}$ . At which pH, will  $Mg^{2+}$  ions start precipitating in the form of  $Mg(OH)_2$  from a solution of 0.001 M  $Mg^{2+}$  ions

8

9

10

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11

35.The largest number of molecules is in

34g of water

28g of  $CO_2$

46g of  $CH_3OH$

54g of  $N_2O_5$

36.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

37.She wants to know where you live ( )

(?)

(!)

(;)

(.)

38.We took a taxi \_\_\_\_ home.

to

for

by

with

39.I never work ..... Fridays.

in

on

by

at

40.Everybody \_\_\_\_ by the terrible news yesterday.



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shocked

were shocked

be shocked

was shocked.