2021-12-26

1.If an electron and a proton having same momentum enter perpendicular to a magnetic field, then

curved path of electron and proton will be same (ignoring the sense of revolution)

they will move undeflected

curved path of electron is more curved than that of the proton

path of proton is more curved

2.A point source of light is placed 4 m below the surface of water of refractive index 5 / 3. The minimum diameter of a disc which should be placed over the source on the surface of water to cut–off all light coming out of water is

2 m

6 m

4 m

3 m

3.Fraunhofer lines are obtained in

Solar spectrum

The spectrum obtained from neon lamp

Spectrum from a discharge tube

None of the above

4.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

5.99% of a radioactive element will decay between

6 and 7 half lives

7 and 8 half lives

8 and 9 half lives

9 half lives

6.A beam of light propagating in medium A with index of refraction n (A) passes across an interface into medium B with index of refraction n(B). The angle of incidence is greater than the angle of refraction; v(A) and v(B) denotes the speed of light in A and B. Then which of the following is true

v(A) $>$ v(B) and n(A) $>$ n(B)

v(A) $>$ v(B) and n(A) $<$ n(B)

v(A) $<$ v(B) and n(A) $>$ n(B)

v(A) $<$ v(B) and n(A) $<$ n(B)

7.An ideal gas heat engine operates in a Carnot's cycle between 227^oC and 127^oC. It absorbs $6 \times 10^4 J$ at high temperature. The amount of heat converted into work is

$4.8 \times 10^4\ J$

$3.5 \times 10^4\ J$

$1.6 \times 10^4\ J$

$1.2 \times 10^4\ J$

8.The position vectors of radius are $2\hat{i} + \hat{j} + \hat{k}$ and $2\hat{i} - 3\hat{j} + \hat{k}$ while those of linear momentum are $2\hat{i} + 3\hat{j} - \hat{k}$. Then the angular momentum is

$2\hat{i} - 4\hat{k}$

$4\hat{i} - 8\hat{k}$

$2\hat{i} - 4\hat{j} + 2\hat{k}$

$4\hat{i} + 8\hat{k}$

9.There is a hole of area A at the bottom of cylindrical vessel. Water is filled up to a height h and water flows out in t second. If water is filled to a height 4h, it will flow out in time equal to

t

4t

2t

t/4

10.The half-life of radium is about 1600 years. Of 100 g of radium existing now, 25 g will remain unchanged after

2400 years

3200 years

4800 years

6400 years

11.Two forces 3N and 2 N are at an angle θ such that the resultant is R. The first force is now increased to 6N and the resultant become 2R. The value of θ is

30°

60°

90°

120°

12.The phase difference between two waves represented by $\begin{matrix} y_1 = 10^{-6}\sin[100t + (x/50) + 0.5]m \\ y_2 = 10^{-6}\cos[100t + (x/50)]m \end{matrix}$ where x is expressed in metres and t is expressed in seconds, is approximately

0.5 rad

1.07 rad

1.5 rad

2.07 rad

13.$x^2 - 3x + 2 < 0$ implies $x \in$:

$(-\infty, 1)$

$(1, 2)$

$(2, \infty)$

$(-\infty, 1) \cup (2, \infty)$

14.The value of

$$\int_{-2}^{2}(ax^3 + bx + c)$$

depends on:

The value of a

The value of b

The value of c

The values of a and b

15.If

$$\int f'(x)dx = \int g'(x)dx$$

then $f(x) - g(x)$ is:

a function of x

zero

a polynomial in x

a constant

16.The line $\frac{x-2}{3}=\frac{y-3}{4}=\frac{z-4}{0}$ is parallel to :

xy-plane

yz-plane

zx-plane

None of these

17.The equation of the lines passing through the origin and parallel to the lines represented by the equation $2x^2-xy-6y^2+7x+21y-15=0$, is

$2x^2-xy-6y^2=0$

$6x^2-xy+2y^2=0$

$6x^2-xy-2y^2=0$

$2x^2+xy-6y^2=0$

18.If the focii of a hyperbola are $(-2,0)$ and $(2,0)$ and directices are $x=\pm 1$, the hyperbola:

has eccentricity 2

is a rectangular hyperbola

has length of major axis equal to $\sqrt{2}$

both (b) and (c)

19.The minimum number of linearly independent vectors to give zero resultant is:

2

3

4

can’t be determined

20.If $\times$ represents certesian product of two sets and Φ represents empty set, then $\Phi\times\Phi=$

Φ

$\{(\Phi,\Phi)\}$

not defined

none of these

21.The co-ordinates of the point where the line $\frac{x-6}{-1}=\frac{y+1}{0}=\frac{z+3}{4}$ meets the plane $x+y-z=3$ are

(2, 1, 0)

(7, -1, -7)

(1, 2, -6)

(5, -1, 1)

22.If $x=3+i$ then $x^3-3x^2-8x+15=$

6

10

-18

-15

23. $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+x & 1 \\ 1 & 1 & 1+y \end{vmatrix} =$

1

0

x

xy

24.The lengths of the sides of a triangle are $\alpha-\beta, \alpha+\beta$ and $\sqrt{3\alpha^2+\beta^2}$, $(\alpha>\beta>0)$. Its largest angle is:

$\frac{3\pi}{4}$

$\frac{\pi}{2}$

$\frac{2\pi}{3}$

$\frac{5\pi}{6}$

25.$y=\frac{e^x+e^{-x}}{e^x-e^{-x}}$ then $\frac{dy}{dx}=$

$\operatorname{sech}^2 x$

$-\operatorname{sech}^2 x$

cosech$^2 x$

$-$cosech$^2 x$

26.Area bounded by $y = x^2$ and $y = \dfrac{2}{1+x^2}$ is :

$\pi - \dfrac{1}{3}$

$\pi - \dfrac{2}{3}$

$2\pi - \dfrac{1}{3}$

none of these

27.If $\ln(x+y) = 2xy,$ then $y'(0) =$

1

-1

2

0

28.The coeff. of x^{10} in the binomial expansion of $(1+x^2)^{10}$ is:

522

252

422

244

29.Ethylene is a member of..... serie

Alkyne

Olefin

Paraffin

Amine

30.N_2 combines with metal to form

Nitride

Nitrate

Nitrite

Nitrosyl chloride

31.Select the true statement about benzene from amongst the following

Because of unsaturation benzene easily undergoes addition reactions

There are two types of C - C bonds in benzene molecule

There is a cyclic delocalisation of pi electrons in benzene

Monosubstitution of benzene group gives three isomeric substances

32.The pH of a 0.001 M NaOH will be

3

2

11

12

33.1.5 mol of O_2 combine with Mg to form oxide MgO. The mass of Mg (at. mass 24) that has combined is

24g

48g

36g

72g

34.Nitric oxide is prepared by the action of HNO_3 on

Fe

Cu

Zn

Sn

35.The ppt of AgCl is dissolved by using NH_3 the product formed is

[Ag(NH_3)]Cl

Ag[(NH_3)$_4$Cl]

[Ag(NH_3)$_3$]Cl

$[Ag(NH_3)_2]Cl$

36.100 *ml* of 0.1 *N* hypo decolourised iodine by the addition of *x g* of crystalline copper sulphate to excess of *KI* . The value of ' *x* ' is (molecular wt. of $CuSO_4.5H_2O$ is 250)

5.0 *g*

1.25 *g*

2.5 *g*

4 *g*

37.He boated on _____ Phewa.

a

an

the

none

38.Winter is setting _____. Wear warm clothes.

in

of

off

with

39.He is _____ smoking and can't break the habit.

given up

given to

given at

given with

40._____ skin is a sensitive organ.

A

An

The

None