Subject: Physics

1. You are given that mass of $\text{mass of } \frac{7}{3}LI = 7.0160 \mu$

   mass of $\frac{4}{2}He = 4.0020 \mu$

   mass of $\frac{1}{1}H = 1.0079 \mu$

When 20g of $\frac{7}{3}LI$ is converted into $\frac{4}{2}He$ by proton capture, the energy liberated (in kWh), is:

   (mass of nucleus = $\frac{1}{C^2}$)

   a) $8 \times 10^6$  b) $1.33 \times 10^6$  c) $4.5 \times 10^5$  d) $6.82 \times 10^5$

Correct Answer: Option B
2. Shown in the figure is a hollow ice cream cone (it is open at the top). If its mass is 'M', radius of its top, R and height H, then its M.O.I about its axis is:

\[
\begin{align*}
\text{a) } & \frac{MH^2}{3} \\
\text{b) } & \frac{MR^2}{3} \\
\text{c) } & \frac{M(R^2 + H^2)}{4} \\
\text{d) } & \frac{MR^2}{2}
\end{align*}
\]

Correct Answer: Option D

3. For the given i/p voltage waveform \(V_i(t)\), the o/p voltage waveform \(V_o(t)\) across the capacitor is correctly depicted by:

Correct Answer: Option B

4. A point-like object is placed at a distance of 1m in front of the convex lens of focal length 0.5m. A plane mirror is placed at a distance of 2m behind the lens. The position and nature of the final image formed by the system is:

a) 1m from the mirror, real

b) 1m from the mirror, virtual

c) 2.6m from the mirror, real
d) 2.6 m from the mirror, virtual

Correct Answer: Option B

5. An AC circuit has $R = 100 \Omega$, $C = 2 \mu F$ and $L = 800 \, \text{mH}$, connected in series. The quality factor of the circuit is:-

a) 0.5 b) 400 c) 20 d) 2

Correct Answer: Option D

6. An $e^-$, a doubly ionized He ion (He$^{2+}$) and a proton are having the same K.E. The relation between the respective De-Broglie wavelength $\lambda_e$, $\lambda_{He^{++}}$ and $\lambda_p$ is

a) $\lambda_e < \lambda_{He^{++}} = \lambda_p$

b) $\lambda_e < \lambda_p < \lambda_{He^{++}}$

c) $\lambda_e > \lambda_{He^{++}} > \lambda_p$

d) $\lambda_e > \lambda_p > \lambda_{He^{++}}$

Correct Answer: Option D

7. Identify the correct o/p signal Y in the given combination of gates (as shown) for the given I/P A and B
8. An electron is moving along the +x direction with velocity \(6 \times 10^6 \text{ m/s}\). It enters a region of uniform electric field \(\vec{E}\) of 300 V/cm pointing along the +y direction. The magnitude and direction of the magnetic field set up in the region such that the electron keeps moving along the -y direction will be:

a) \(5 \times 10^{-3}T\) along the -z direction
b) \(3 \times 10^{-4}T\) along the -z direction
c) \(3 \times 10^{-4}T\) along the +z direction
d) \(5 \times 10^{-4}T\) along the +z direction

Correct Answer: Option A

9. A sound source ‘S’ is moving along a straight track with the speed \(v\), and is emitting sound of frequency \(\nu_0\) (see figure). An observer is standing at a finite distance, at the point O, from the track. The time variation of frequency heard by the observer is best represented. \(E_0\) represents the instant when the distance between the source and the observer is minimum:
10) An object of mass 'm' is suspended at the end of a massless wire of length L and area of cross-section A. Young's modules of the material of the wire is Y. if the mass is pulled down slightly its freq. of oscillation along the vertical direction is:

a) \[ f = \frac{1}{2\pi} \sqrt{\frac{mA}{YL}} \]

b) \[ f = \frac{1}{2\pi} \sqrt{\frac{YL}{mA}} \]

c) \[ f = \frac{1}{2\pi} \sqrt{\frac{YA}{mL}} \]

Correct Answer: C
11) A particle of charge 'q' and mass 'm' is moving with velocity \(-v \neq 0\) towards a large screen in the Y-Z plane at a distance 'd'. If there is a magnetic field \(\vec{B} = B\hat{k}\), the minimum value of \(v\) for which the particle will not hit the screen is:

\[
\frac{qdBo}{m}
\]

a) \(\frac{qdBo}{m}\)
b) \(\frac{qdBo}{3m}\)
c) \(\frac{qdBo}{2m}\)
d) \(\frac{2qdBo}{m}\)

Correct Answer: Option A

12) Molecules of an ideal gas are known to have 3 translational D.O.F and two rotational D.O.F. The gas is maintained at temperature T. The total internal energy, \(U\) of a mole of this gas, and the value of \(\frac{y}{v} = \frac{cp}{cv}\) are given respectively, by:

\[
v = \frac{5}{2} RT \quad \text{and} \quad y = \frac{6}{5}
\]

a) \(v = \frac{5}{2} RT \) and \( y = \frac{6}{5}\)
b) \( v = \frac{5}{2}RT \) and \( y = \frac{7}{5} \)

c) \( v = \frac{5}{2}RT \) and \( y = \frac{7}{5} \)

d) \( v = \frac{5}{2}RT \) and \( y = \frac{7}{5} \)

Correct Answer: Option C

13) An insect is at the bottom of a hemisphere ditch of radius 1m. It crawls up the ditch but starts skipping after it is at height 'h' from the bottom. If the coefficient of friction b/w the ground and insect is 0.75. Then h is: \( (g = 10m/s^2) \)

a) 0.6m
b) 0.45m
c) 0.2m
d) 0.8m

Correct Answer: Option C

14) A screw gauge has 50 divisions on its circular scale. The circular scale is 4 units ahead of the pitch scale marking, prior to use. Upon a complete rotation of the circular scale, a displacement of 0.5mm is noticed on the pitch scale. The nature of zero error involved and the least count of the screw gauge is respectively.

a) positive, 0.1\( \mu m \)
b) positive, 0.1mm
c) negative, 2\( \mu m \)
15) A clock has a continuously moving second's hand of 0.1 m length. The average acceleration of the tip of the hand (in $m/s^2$)
is of the order of:

a) $10^{-4}$
b) $10^{-1}$
c) $10^{-3}$
d) $10^{-2}$

Correct Answer: Option A

Que.- 16- In the figure below, $P$ and $Q$ are two equally tense convert sources emitting radiation of wavelength 20 m. The separation b/w $P$ and $Q$ is 5 m and the phase of $P$ is ahead of that of $Q$ by 90°. $A$, $B$ and $C$ are 3 distinct points of observation, each equidistant from the mid-point of $PQ$.

The intensities of radiation at $A$, $B$ and $C$ will be in the ratio:-

(a) 2 : 1 : 0  (b) 4 : 1 : 0  (c) 0 : 1 : 4  (d) 0 : 1 : 2

Correct Answer: Option A
Que.-17- A satellite is in an all-optical orbit around the planet $P$. It is observed that the velocity of the satellite when it is most part from the planet is 6 times less than that when it is closest to the planet. The ratio of distances b/w the satellite and the planet at closest and farthest point is :-

(a) 3 : 4  (b) 1 : 6  (c) 1 : 2  (d) 1 : 3

Correct Answer: Option B

Que. - 18- If the $P.E.$ b/w two molecules is given by \[ U = \frac{-A}{r^6} + \frac{B}{r^{12}} \], then at equilibrium, separation b/w the molecules and the $P.E.$ are :-

(a) \( \left( \frac{2B}{A} \right)^{\frac{1}{6}}, \frac{-A^2}{2B} \)  (b) \( \left( \frac{B}{A} \right)^{\frac{1}{6}}, 0 \)  (c) \( \left( \frac{B}{2A} \right)^{\frac{1}{6}}, \frac{-A^2}{2B} \)  (d) \( \left( \frac{2B}{A} \right)^{\frac{1}{6}}, \frac{-A^2}{4B} \)

Correct Answer: Option D

Que.- 19- Four-point masses each of mass $m$, are proved at the corners of a square of side $l$. The square is rotating with angular frequency $\omega$, about an axis passing through one of the corners of the square and parallel to its diagonal, as shown in the figure. The angular momentum of the square about this axis is:-

(a) $ml^2 \omega$  (b) $2ml^2 \omega$  (c) $3ml^2 \omega$  (d) $4ml^2 \omega$

Correct Answer: Option C
Que.- 20- Charges $Q_1$ and $Q_2$ are at points A and B of a right angle triangle $OAB$ (see figure). The resultant electric field at point 'O' is perpendicular to the hypotenuse, the $Q_1/Q_2$ is proportional to

\[
\frac{x_2}{x_1} \quad \frac{x_3}{x_1} \quad \frac{x_1}{x_1} \quad \frac{x_2}{x_1}
\]

(a) $x_1$  (b) $x_2$  (c) $x_2$  (d) $x_1^2$

Correct Answer: Option B

Que. -21 - Suppose that the intensity of laser as $\left(\frac{315}{\pi}\right) \frac{\omega}{m^2}$. The RMS O electric field, in units of $\frac{\nu}{m}$ associated with this source is close to the nearest integer is:_____.

Take $\epsilon_0 = 8.86 \times 10^{-12} \text{C}^2\text{N}^{-1}\text{m}^{-2}$, $C = 3 \times 10^2 \text{m/s}$

Correct Answer: 275

Que.- 22- Two bodies of the same mass are moving at the same speed but in a different direction on a plane. They have a completely inelastic collision and move together thereafter with a final speed which is half of their initial speed. The angle b/w the initial velocities of the two bodies (in degree) is ______.

Correct Answer: 120
23) A part of the complete circuit is shown in the figure. At some instant, the value of current $I = 1\, A$ and $1 + i$ is decreasing at a rate of $10^2\, A/s$. The value of the potential difference $V_P - V_Q$ (in volts) at that instant, is ____________

Correct Answer: Question incomplete

24) Initially, a gas of diatomic Molecules is contained in a cylinder of volume $V$, at a pressure $P_1$ and temperature $250\, k$. Assume that 25% of the molecules gets dissociated causing a change in no.of moles. The pressure of the resulting gas at temperature $2000\, k$, when contained in the volume $2V_1$ is given by $P_2$. The ratio of $P_1 \cdot P_2$ is _____.

Correct Answer: 6

25) The density of a solid metal sphere is determined by measuring by its mass and its diameter. The maximum error in the density of the sphere is $(\frac{x}{100})\%$. If the relative errors in measuring the mass and diameter are 6% and 1.5 % respectively. The value of ‘x’ is ____________.

Correct Answer: 1050

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Subject: Chemistry

Total Questions: 25

1) The increasing order of $P_{kb}$
a) II<IV<III<I
b) II<I<III<IV
c) I<II<III<IV
d) I<II<IV<III

Correct Answer: Option d

2) The presence of soluble fluoride ion up to 1ppm concentration in drinking water is
a) Harmful to skin
b) Harmful to bone
c) Harmful to teeth
d) Safe for teeth

Correct Answer: Option d

3) Kraft temp is the temp
a) Above which the ag.sol of detergent start boiling
b) below which the formation of micelle takes place
c) above which the formation of micelle takes place
d) below which the ag.sol of detergent start boiling
4) For the reaction
\[ Fe_2N(s) + \frac{3}{2}H_2(g) \rightleftharpoons 2Fe(s) + NH_3(g) \]

a) \( K_c = K_p(RT)^{-\frac{1}{2}} \)
b) \( K_c = K_p(RT)^{\frac{1}{2}} \)
c) \( K_c = K_p(RT) \)
d) \( K_c = K_p(RT)^{\frac{3}{2}} \)

Correct Answer: Option B

5) The major product

Correct Answer: Option B
6) Consider the following reaction \( A \rightarrow P_1 \rightarrow P_2 \rightarrow P_3 \rightarrow P_4 \)

The order of the above reactions one a, b, c, and d respectively. The following graph is obtained when log [rate] Vs log [conc.] are plotted.

Among the following the correct seq. of the order of reaction are

a) \( d > b > a > c \)
b) \( d > a > b > c \)
c) \( c > a > b > d \)

Correct Answer: Option B
7) **Assertion (A)**: Ethane Polymerized in the presence of Ziegler Nafta. Catalyst at a high temp. and the press is used to make buckets and dustbin.

**Reason (R)**: High-density polymers are closely packed and are chemically inert. choose correct answer.

a) A) and R) wrong

b) A) right R) Wrong

c) both A) and R) is right but R) is not correct explained

d) both A) and R) is right and R) is the correct explanation of A)

**Correct Answer: Option D**

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Que.- 8- Which of the following show geometrical isomerism.

(a) \(4 - \text{methylpent-1-ene}\)

(b) \(2 - \text{methylpent-1-ene}\)

(c) \(2 - \text{methylpent-1-ene}\)

(d) \(4 - \text{methylpent-2-ene}\)

**Correct Answer: Option D**

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Que.-9- The correct st.wrt.dinitrogen

(a) \(N_2\) is paramagnetic in nature.
(b) It can be combined with the diagram at $25^\circ C$

(c) It can be used as an inert diluent for reactive chemical.

(d) Liq. dinitrogen is not used in cryosurgery.

Correct Answer: Option C

Que. -10- The set that contain the atomic number of an only transition element.

(a) 21, 25, 42, 72

(b) 21, 32, 53, 64

(c) 9, 17, 34, 38

(d) 37, 42, 50, 64

Correct Answer: Option A

Que.- 11- The major product

Correct Answer: Option B
Que. - 12- The incorrect one-

(a) brass is an alloy of $Cu$ & $Ni$

(b) dust iron is used to manufacture brought iron.

(c) german silver is an alloy of $Zn$, $Cu$ and $Ni$.

(d) bronze is alloy of $Cu$ and $Sn$.

Correct Answer: Option A

Que. - 13- Major product - 

(a)

(b)

(c)
Correct Answer: Option B

Que.- 14 - The species that has spin $2y$ magnetic moment $5.9 \quad BM(Td - Tetrahedral)$

(a) $[NiCl_4]^{2-} \quad (Td)$
(b) $[MnBr_4]^{2-} \quad (Td)$
(c) $Ni(CO)_4 \quad (Td)$
(d) $[CN \cdot Ni(CN)_4]^{2-} \quad$ Sq. plan

Correct Answer: Option B

15) The variation of equilibrium constant with temperature is given below

<table>
<thead>
<tr>
<th>Temp</th>
<th>eq. constant</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_1 = 25^\circ C$</td>
<td>$K_1 = 10$</td>
</tr>
<tr>
<td>$T_2 = 100^\circ C$</td>
<td>$K_1 = 100$</td>
</tr>
</tbody>
</table>

The value of $\Delta f_1^0$, $\Delta f_1^0$ at $T_1$ and $\Delta f_1^0$ at $T_2$ in $K \cdot mol^{-1}$ respectively are close to

a) 28.4, -7.14, -5.71
16) Arrange the following solution in the decreasing order of POH

A) 0.01\( \text{MHCL} \)
B) 0.01\( \text{NaOH} \)
C) 0.01\( \text{MCH}_3\text{CCONa} \)
D) 0.01\( \text{NaCl} \)

a) \( B > C > D > A \)
b) \( B > D > C > A \)
c) \( A > D > C > B \)
d) \( A > C > D > B \)

Correct Answer: Option C

17) The lanthanoid does not show +4 oxidation state is

a) Tb
b) Ce
c) Eu
d) Dy

Correct Answer: Option C

18) Consider the following reaction

Correct Answer: Option D

19) Among the sulfate of alkaline earth metal the solubilities of $BeSO_4$ and $MgSO_4$ in water

a) high and poor
b) poor and poor
c) high and high
d) poor and high

Correct Answer: Option C
20) Solution of two components containing \( n_1 \) moles of 1st component and \( n_2 \) moles of 2nd component is prepared, \( M_1 \) and \( M_2 \) are molecular wt. of component 1 and 2 respectively. If \( d \) is density of the solution in \( \text{g mL}^{-1} \), \( C_2 \) is the molarity and \( x_2 \) is the mole fraction of 2nd component, \( C_2 \) can be expressed of.

\[
c_2 = \frac{dx_2}{M_2 + x_2(M_2 - M_1)}
\]

a) \[
c_2 = \frac{dx_1}{M_2 + x_2(M_2 - M_1)}
\]

b) \[
c_2 = \frac{1000dx_2}{M_1 + x_2(M_2 - M_1)}
\]

c) \[
c_2 = \frac{1000x_2}{M_1 + x_2(M_2 - M_1)}
\]

d) \[
c_2 = \frac{1000x_2}{M_1 + x_2(M_2 - M_1)}
\]

Correct Answer: Option C

21) The elevation of b.p. of 0.01 m aq \( CrCl_3 \cdot x NH_3 \) sol. in two times that of 0.05 aq. \( CaCl_2 \) sol. The value of \( x \) ____

(Assume 100% ionization of complex and \( CaCl_2 \) Coord. No. of Cr as 6 and that of all \( NH_3 \) molecules are present inside the coordi sphere.)

Correct Answer: 5

22) Potassium chlorate is prepared by the electrolysis of \( KCi \) in basic solution: \( 60H^- + Cl^- \rightarrow ClO_3^- + 3H_2O + Be^- \). If only 60% of current utilized in the reaction, the time (hr) req. to produce 10 g of \( KCiO_3 \) using a current of 2 A is ___

\( F = 96500 \ \text{C mol}^-1 \), \( KCiO_3 = 122 \ \text{g mol}^-1 \)

Correct Answer: 11
23) A spherical bullon of radius 3 cm contain $He$ gas has a pressure of $48 \times 10^{-3}$ bar. At the same temp. the pressure of spherical balloon of radius 12 cm containing the same amount of gas will be _____$\times 10^{-6}$ bar.

Correct Answer: 750

24) In an estimation of bromine by carius method 1.6 g of an org compound give 1.88 g of $AgBr$: The mass % of Bromine in the compound is

Correct Answer: 50

25) The number of $Cl = 0$ bond in perchloric acid is ______

Correct Answer: 3

1) Two families with 3 members each and one family with 4 members each are to be seated in a row. In how many ways can they be seated so that the same family member are not separated?

a) $2!3!4!$

b) $(3!)^2 (4!)$

c) $(3!) (4!)^3$

d) $(3!)^3 (4!)$

Correct Answer: Option D
2) The shortest distance b/w the line 
\[
\begin{align*}
\frac{x-1}{0} &= \frac{y+1}{1} = \frac{z}{-1}
\end{align*}
\]
and \(x+y+z=0, \ 2x-y+z+3=0\) is 
\[\left| \frac{1}{\sqrt{2}} \right|, \left| \frac{1}{2} \right|, \left| \frac{1}{\sqrt{3}} \right|\]
Correct Answer: Option C

3) If \(\{P\}\) denotes the fractional part of number \(P\), then \(\left\{ \frac{3^{200}}{8} \right\}\) is equal to
a) 8
b) 3
  c) 8
  d) 8
Correct Answer: Option C

4) If \(I_1 = \int_0^1 (1-x^{50})^{100} \, dx\) and \(I_2 = \int_0^1 (1-x^{50})^{101} \, dx\) such that \(I_2 = \alpha I_1\) then \(\alpha = ?\)

a) 5049
b) 5050

Correct Answer: Option C
(c) 5050
(d) 5051

5) Let m and n be respectively the min and max value of the determinant 
\[
\begin{vmatrix}
\cos^2 x & 1 + \sin^2 x & \sin 2x \\
1 + \cos^2 x & \sin^2 x & \sin 2x \\
\cos^2 x & \sin^2 x & 1 + \sin 2x
\end{vmatrix}
\]
then ordered pair (m,n) = ?

a) (-4,-1)
b) (1,3)
c) (-3,3)
d) (-3,-1)

Correct Answer: Option D

6) Let \( L_1 \) be the tangent to the parabola \( y^2 = 4(x + 1) \) and \( L_2 \) be the tangent to the parabola \( y^2 = 8(x + 2) \) such that \( L_1 \) and \( L_2 \) intersect at \( 90^\circ \). Then at \( L_1 \) and \( L_2 \) meet on the st. line.

a) \( 2x + 1 = 0 \)
b) \( x + 2 = 0 \)
c) \( x + 3 = 0 \)
d) \( x + 2y = 0 \)
7) If \( f(x + y) = f(x)f(y) \) and \( \sum_{x=1}^{\infty} f(x) = 2, \ x, y \in N \). Then the value of \( f(4) \) is ....
   a) 2/3
   b) 1/9
   c) 1/3
   d) 4/9
   Correct Answer: Option D

8) The value of \( \lambda \) and \( \mu \) for which the system of linear eq \( x + y + z = 2, \ x + 2y + 3z = 5, \ x + 3y + \lambda z = \mu \) has infinitely many solutions are respectively ...
   a) 5 & 8
   b) 4 & 9
   c) 6 & 8
   d) 5 & 2
   Correct Answer: Option A

9) The negation of \( p \lor (\sim p \land q) \)
   a) \( \sim p \land \sim q \)
   b) \( p \land \sim q \)
   c) \( \sim p \lor q \)
10) The position of moving car at time $t$ is given as $f(t) = 3t^2 + bt + c, t > 0$ where $a, b, c$ are real no. $> 1$ Then the avg speed of the car over the time interval $[t_1, t_2]$ is attained at the pt. ....

a) $(t_2 - t_1)/2$  
b) $a(t_2 + t_1) + b$  
c) $20(t_2 + t_1) + b$  
d) $(t_2 + t_1)/2$

Correct Answer: Option A

11) A ray of light coming from the general eqn of the pt $(1, 2\sqrt{3})$ is incident at an angle $30^\circ$ on the line $x=1$ at point A. The ray gets reflected on the line $x=1$ and meets $x$-axis at pt.B Then the line AB pass via ...

a) $(4, -\sqrt{3})$  
b) $(3, -\sqrt{3})$  
c) $(3, -1/\sqrt{3})$  
d) $(4, -\sqrt{3}/2)$

Correct Answer: Option B

12) $\alpha, \beta$ two roots of the eqn $x^2 - 64x + 256 = 0.$ Then $\left(\frac{\alpha^3}{\beta^3}\right)^{1/8} + \left(\frac{\beta^3}{\alpha^3}\right)^{1/8} = ?$

a) 3  
b) 2  
c) 4  
d) 1

Correct Answer: Option B
13) \( \lim_{x \to 1} \frac{(x-1)^2 t \cdot \cos(t^2) dt}{(x-1) \sin(x-1)} \) is equal to...

a) -1/2
b) 1/2
c) does not exist
d) 0

Correct Answer: Option D

14) The region represented by \( \{ z = x + iy \in \mathbb{C} : |z| - Re(z) \leq 1 \} \) is also given by

a) \( y^2 \geq 2(x + 1) \)  b) \( y^2 \leq 2(x + 1/2) \)  c) \( y^2 \leq (x + 1/2) \)  d) \( y^2 \geq (x^2 + 1) \)

Correct Answer: Option B

15) Out of 11 consecutive natural no if 3 are selected at random without repeat Then the probability that they are in AP with +ve c.d

a) 5/33  b) 10/99  c) 3/101  d) 15/101

Correct Answer: Option A

16) The general eqn of the DE

\[ \frac{dy}{dx} = \sqrt{1 + x^2 + y^2 + x^2 y^2} \]
17) Which of the following pts lie on the locus of foot of perpendicular drawn upon any tangent to the ellipse \( \frac{x^2}{4} + \frac{y^2}{2} = 1 \) from any of it's foci?

a) \((1, 2)\)  b) \((-2, \sqrt{3})\)  c) \((-1, \sqrt{2})\)  d) \((-1, \sqrt{3})\)

Correct Answer: Option D

18) Let \(a, b, c, d\) and \(p\) be any non zero distinct real nos such that \( (a^2 + b^2 + c^2)p^2 - 2(ab + bc + cd)p + (b^2 + c^2 + d^2) = 0 \) then

a) \(a, c, p\) are in A.P
b) \(a, b, c, d\) are in A.P
c) \(a, b, c, d\) are in G.P
d) \(a, c, p\) are in G.P
19) If \( \sum_{i=1}^{n} (x_i - a) = n \) and \( \sum_{i=1}^{n} (x_i - a)^2 = na \), then the solution of \( n \) observation \( x_1, x_2, \ldots, x_n \) are.

a) \( n(\sqrt{a - 1}) \), b) \( n(a - 1) \), c) \( a - 1 \), d) \( \sqrt{a - 1} \)

Correct Answer: Option D

20) The area in sq unit of the region \( A \) is \( \{ x, y : |x| + |y| \leq 1, 2y^2 \geq |x| \} \)

a) \( \frac{5}{6} \), b) \( \frac{1}{6} \), c) \( \frac{7}{6} \), d) \( \frac{1}{3} \)

Correct Answer: Option A

21) If \( \vec{a} \) and \( \vec{b} \) are unit vectors then the greatest value of \( \sqrt{3} \left| \frac{\vec{a}}{\vec{b}} + \frac{\vec{b}}{\vec{a}} \right| + \left| \frac{\vec{a}}{\vec{b}} - \frac{\vec{b}}{\vec{a}} \right| \) is

Correct Answer: 4

22) Let AD and BC be two vertical poles of A&B on horizontal ground. If AD=8 and BC=11 and AB=10 then the distance of the point M on AB from the pt A such that \( MD^2 + MC^2 \) is min is ...

Correct Answer: 5

23) Let \( f : \mathbb{R} \to \mathbb{R} \) defined as

\[
f(x) = \begin{cases} 
  x^5 \sin \left( \frac{1}{x} + 5x^2 \right), & x < 0 \\
  0, & x = 0 \\
  x^5 \cos \left( \frac{1}{x} + x^2 \right), & x < 0
\end{cases}
\]
The value of λ for which \( f''(x) \) exists is.

**Correct Answer:** 5

24) Set A has m element and set B has n elements if the total no of the subset of A is 112 more than the total no of subsets of B then m-n =?

**Correct Answer:** 4

25) The angle of elevation of the top of a hill from a pt o the horizontal plane passing through the foot of the hill is found to be 45°. After walking a distance of 30m towards the top up a slope inclined on the angle of elevation of the top of the hill becomes 75°. Then the height of the hill in m is

**Correct Answer:** 30