NTSE PHYSICS SOLUTIONS

1. (4)

$P = F V_{rel}$

$V_{rel} = V_{BA} = t\ 2.5$

m/s $P = +100\ (2.5)$

$P = 250$ w

2. (1)

$$\frac{d}{V_m + V_R} = 3.....(1)$$

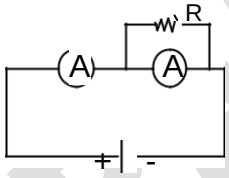
$$\frac{d}{V_m - V_R} = 6.....(2)$$

Solving (1) and (2)

$V_R = d/12$

T = 12 hours

3. (1)



As total potential difference is constant across the circuit, current will across A and this decreases the potential difference across v will decrease and across A increases

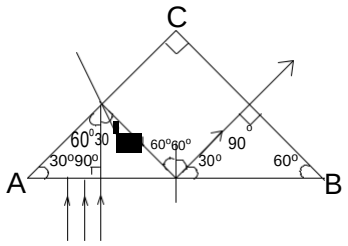
4. (4)

$\delta = (\mu - 1)A$ for $A = 2^o$, $\delta = 1^o$.

As $\delta = 1^o$, $\mu \approx \frac{3f}{2}$, v = 3f

5. (1)

As $\mu = 2.1$, $\sin^{-1}\frac{10}{21} = 28^{o}.26'$ Critical Angle.



The ray will come out of CB

6. (2)

$mg_B (T - 0) = m_e L$

$ms_B T = -PL$

$ms_B T = \frac{m}{d2} L \times P_\ell$

By Solving $T = 39.82^{o}C$.

7. (3)

P.D. across 500 Ω = P.D across

$\Rightarrow (R_1+R_2+R_3) = 125$ ……. (1)

P.D. across $(500+R_1)$ = P.D across (R_2+R_3)

$\Rightarrow (500+R_1) = 49 (R_2+R_3)$ ……. (2)

P.D. across $(500+R_1+R_2)$ = P.D across R_3

$\Rightarrow (500+R_1+R_2) = 499\ R_3$ ……..

(3) From (1) and (3)

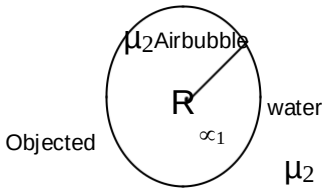
We get $R_3 = 1.25$ Ω

8. (2)

For refraction at spherical surfaces

Form denser to rarer medium

$$\frac{\mu_1}{v} - \frac{\mu_2}{v} = \frac{(\mu_1 - \mu_2)}{R} \quad .....(1)$$



Form rarer to denser

$$\frac{\mu_2}{v} - \frac{\mu_1}{vR} = \frac{(\mu_2 - \mu_1)}{\quad} .....(2)$$

Substituting value in equation (1) and (2) the final image is formed at $\frac{2R}{3}$ and it is virtual image

9. (2)

$$g_h = g\left(1 - \frac{2h}{R}\right).....(1)$$

$$g_h = 0.99g.....(2)$$

Solving equation (1) and (2)

$$h = \frac{R}{200} = \frac{6400}{200} = 32km$$

10. (2)

$$v \alpha \frac{1}{x}, \; v = \frac{R}{x}$$

When x = 1 m, v= 0.02 m/s

So, R = 0.02

$$\frac{dx}{dt} = \frac{R}{x}$$

$$\int_1^2 x\,dx = \int_0^T R\,dt$$

$$\frac{x^2}{2}\Big|_1^2 = \frac{2}{100}T$$

T=758

11. (3)

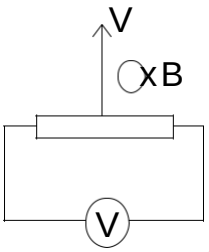
$E = \frac{-d}{dt}$

$\frac{d}{}$

So, $E = -\frac{(BA)}{}$

$\frac{BdA}{}$

$E = \frac{}{} = B\ell v$



E = Bℓv only if the rod moves in any direction

12. (3)

$B = V \delta g$

$= \frac{3}{}$

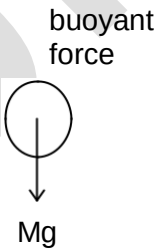
$\delta g \, d$

$= \frac{3}{2} m \delta g$

As $\delta = 1gm / m^3$

$\frac{3}{}$

$B = -mg$



Resultant force = B – Mg = Mg/2 (upward)

a = -g/2

$\mu = \sqrt{2gh}$

$v^2 - u^2 = 2as$

V = 0, S = 20m

13. (1)

As tension in thread A becomes zero all the masses fall under gravity so $a_1 \neq 0$, $a_2 \neq 0$, $a_3 \neq 0$, $a_4 \neq 0$.

NTSE CHEMISTRY SOLUTIONS

114. i) B, C are more active than Hydrogen
ii) B is more reactive than A, C, D
iii) Due to oxidizing nature of HNO_3
$\therefore$ B < C < A < D $\Rightarrow$ Ans. : 1

115. $Zn + 2\,AgNO_3 \rightarrow Zn(NO_3)_2 + 2\,Ag$ (Displacement, Redox reaction) $Ca(OH)_2 \rightarrow CaO + H_2O$ (Decompistion)

$Cu(NO_3)_2 + Na_2S \rightarrow \underset{(Black\ ppt)}{CuS_{(2)}} \downarrow 2NaNO_3$ (Precipitation reaction)

$H_2SO_3 + 2\,KOH \rightarrow K_2SO_3 + 2H_2O$ (Neutralization reaction)

Ans. : 3

116. i) Ba & F (metal, non-metal); K & O (metal, non-metal) form ionic bond ii) $C-F$ bond is more polar ($E.N$ of C = 2.5 & F = 4)

iii) $I-H$ bond is more (E.N of I = 2.5, H covalent

iv) $N-F$ bond is covalent (E.N of N = 3.0, F = 4) so less polar
Ans. : 1

117. If pH down to zero. That means the solution is more acidic $\therefore$ The quote is wrong
Ans. : 2

118. C_2H_4 – alkene

C_7H_{12} – alkyne

$C_{13}H_{28}$ – alkane

C_5H_{10} – cyclo alkane

Ans. : 2

119. aldehyde $-\overset{o}{C}-H$; Ether $(-O-)$; Carboxylic acids $-\overset{o}{C}-O-H$; Ester $-\overset{o}{C}-O-R$

Ans. : 2

120. $NaN_3^- \Rightarrow N_3^-$ (azide ion) contains 3 atoms & 22 electrons. $CO_2 \Rightarrow$ contains 3 atoms & 22 electrons
Ans. : 3

121. Blood is a colloidal solution Ans. : 1

122. Na^+ is smallest in size
Ans. : 4

123. Presense of hydrophilic & hydrophobic groups only Ans. : 4

124. Softness is due to weak vanderwaal forces between any two layers Ans. : 4

5

125. $C_2H_2 + -O_2 \rightarrow 2CO_2 + H_2O$

Ans. : 2

126. Compounds A, C and D are wrong
Because in A; X is in +3 state (wrong)
in C; ClO_4^- is in $^-$ 5 state (wrong)
D; NO_3^- is in -3 state (wrong)

141. $x + 3y – z = 4$ ….. (1)

$3x + 3y + z = 12$ ….. (2) (x +

$3y)^2 – z^2 = 36$ ….. (3) (x +

$3y + z) (x + 3y – z) = 36$ (x +

$3y + z) (4) = 36$

$x + 3y + z = 9$ …... (4)

(2) – (4) $\Rightarrow 2x = 3$

$x = 3/2$

142. $x^2 + px + q = 0$

$\alpha = \tan 30^o$, $\beta = \tan 15^o$

$\alpha + \beta = \tan 30^o + \tan 15^o = -p$

$\alpha\beta = \tan 30^o \tan 15^o = q$

$\frac{\alpha + \beta}{1 - \alpha b} = \frac{-p}{1 - q}$

$\frac{\tan 30^o + \tan 15^o}{1 - \tan 30^o \tan 15^o} = \frac{-p}{1 - q}$

$\tan 45^o = \frac{-p}{1 - q}$

$1 – q = - p$

$Q – p = 1$

$2 + q – p = 2 + 1 = 3$

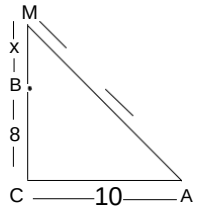
143. 30, 72 and x

LCM – 30, 72 = 360

HCF–30,72=6

The third number = LCM/HCF = 360/6 =

60 x = 60

144. 

$(18-x)^2 = (x+8)^2 + (10)^2$

145. $a - 7b + 8c = 4$

$8a + 4b - c = 7$

Consider $c = k$

$a - 7b = 4 - 8k$

$$a = \frac{5k - 13}{1212}, \quad b = \frac{5 - 13k}{1212}$$

$$a^2 - b^2 + c^2 = \frac{5k - 13}{12}^2 - \frac{5 - 13k}{12}^2 + k^2 = 1$$

146. $x^3 + 3x^2 + 4x - 11 = 0$

$a + b + c = -3$ $ab + bc + ca = 4$, abc

$= 11$ $t = -(a + b)(b + c)(c + a)$

$-[2abc + a^2 b + b^2 c + c^2 a + ab^2 + bc^2 + ca^2]$

$(a + b + c)(ab + bc + ca) = (-3)(4)$

$3abc + a^2 b + b^2 c + c^2 a + ab^2 + bc^2 + ca^2 = -12$

$2abc + a^2 b + b^2 c + c^2 a + ab^2 + bc^2 + ca^2 = -23$

$-[-23] = 23$

147. $a < b < c < d < e$

$a = x - 2$, $b = x - 1$, $c = x$, $d = x + 1$, $e =$

$x+2$ $b + c + d$ = perfect square

$3x$ = perfect square

$a + b + c + d + e$ = perfect cube

$5x$ = perfect cube

$x = 675 = 5 \times 5 \times 3 \times 3 \times 3$

$3x$ = perfect square

$5x$ = perfect cube

148. $x^4 - 11x^3 + kx^2 + 269x - 2001$

a, b, c, d, are roots

$a + b + c + d = 11 \Rightarrow x + y = 11$

$ab + bc + cd + da + ac + bd = k$

$abc + bcd + cda + abd = -269$

$abcd = -2001$

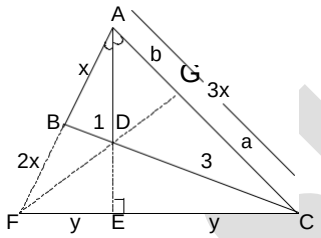
$cd = -69 \Rightarrow ab = 29$

$29(c) + b(-69) + a(-69) + d(29) = -269$

$a + b = 6 \qquad c + d = 5$

$k = ab+bc+cd+da+ac+bd = 29-69+(a+b)(c+d) = 29-69+30 = -10$

149.



In ΔAFC

$$\frac{AB}{BF} \times \frac{FE}{EC} \times \frac{CG}{GA} = 1$$

$$\frac{x}{2x} \times \frac{y}{y} \times \frac{a}{b} = 1$$

$$\frac{a}{b} = \frac{2}{1}$$

$$\frac{(FGC) - DGC}{FGA - DGA1} = \frac{2}{}$$

$$\frac{ar(DFC)}{ar(ADF)} = \frac{2}{1}$$

$\frac{2y}{zx} = \frac{2}{1}$, $\frac{x}{y} = \frac{1}{3}$

$\frac{ar(\ ABD)}{ar(\ CDE)} = \frac{1}{3}$

150. x-1, x, x+1 are

$\lfloor$sides$\rfloor$ C= 2A

Sin C = Sin 2A

Sin C = 2 Sin A Cos A

$\frac{C}{2R} = \frac{2a}{2R}$.cos A

C

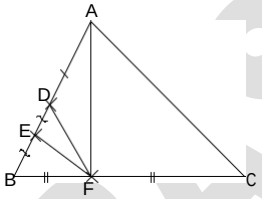
cos A = —

$\frac{b^2 + c^2 - a^2}{2bc} = \frac{}{2a}$ c

⇒ x = 5

⇒ sides are 4, 5, 6 perimeter is 15

151.

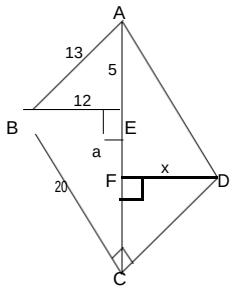


ar (ΔABC) = 96

ar (ΔABF) = 48

ar (ΔADF) = 24, ar (ΔBDF) = 24, ar (ΔEDF) = 12, ar

(ΔAEF) = ar (ΔADF) + ar (ΔEDF) = 24 + 12 = 36



152.

EF = a, FC = 16-a

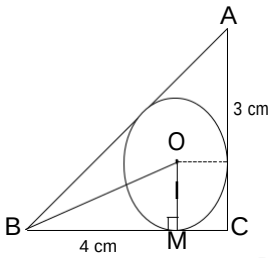
AEB ~ DFA BEC ~ DFC

$\frac{AE}{DF} = \frac{EB}{FA}$ $\frac{BE}{DF} = \frac{EC}{FC}$

$\frac{5}{x} = \frac{12}{a+5}$ $\frac{12}{x} = \frac{16}{16-a}$

$5a + 25 = 12x$ $232 - 12a = 16x$

$\Rightarrow x = \frac{20}{33} = 6\frac{2}{}$



153.

$\Delta = 6, S = 4+3+5/2 = 6$

$r = \Delta/5 = 1$

$OC^2 = OM^2 + CM^2 = 1^2 + 3^2$

$OC = \sqrt{10}$

154. $p(x) = x^4 + ax^3 + bx^2 + cx$

+d P(1) = p(2) = p(3) = 0

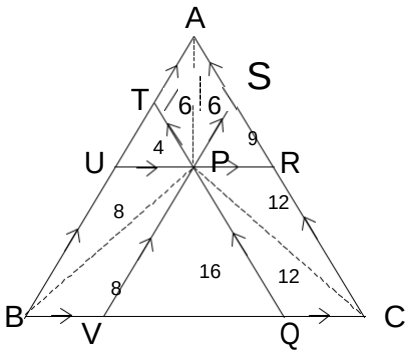
P(x) = (x-1)(x-2)(x-3)(x-a)

P(4)+p(0) = (4-1)(4-2)(4-3)(4-4)+(-1)(-2)(-3)(-a)

= 6(4-a)+6a

= 24-6a+6a

= 24



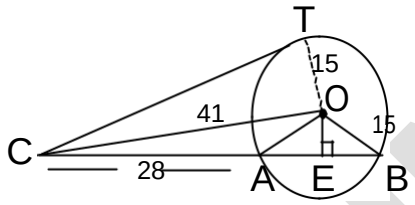
155.

TUP ~ PVQ SPR ~ PVQ

$\frac{UP}{VQ} = \frac{2}{4} = \frac{1}{2}$ $\frac{PR}{VQ} = \frac{3}{4}$

$\frac{BV}{VQ} = \frac{1}{2}$ $\frac{QC}{VQ} = \frac{3}{4}$

Similarly $\frac{AT}{TU} = \frac{3}{2}$



156.

$CT^2 = C.A.C.B$

$CO^2 - OT^2 = 28(28+AB)$

$41^2 - 15^2 = 28(28+AB)$

$AB=24$

$AE=12$

157. $\sin\alpha + \cos\alpha = \frac{-b}{a}$

$\sin\alpha.\cos\alpha = \frac{c}{a}$

$-(\sin\alpha + \cos\alpha) = \frac{b^2}{a}$

$\sin^2\alpha + \cos^2\alpha + 2\sin\alpha\cos\alpha = \frac{b_2}{a^2}$

$1 + \frac{2c}{a} = \frac{b_2}{a^2} \Rightarrow a^2 + 2ac = b^2$

158. $|x|+|y| = 1$

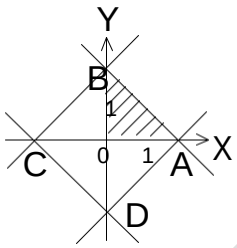
We get st. lines

$x + y = 1$

$x – y = 1$

$- x + y = 1$

$- x – y = 1$



159. $3^9 + 3^{12} + 3^{15} + 3^n$

$= 3(1 + 3^3 + 3^6 + 3^{n-9})$

$= 3^9$ is a perfect cube

$= 3^9 (757 + 3^{n-9})$

If $n = 14 \Rightarrow 3^{n-9} = 3^{14-9} = 3^5 = 243$

$\Rightarrow 757 + 243 = 1000$ is a perfect cube

$\Rightarrow n = 14$

160. 7744 is a perfect square

$7744 = (88)^2$