HINTS & SOLUTIONS (PRACTICE PAPER-2)

ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	D	A	A	A	C	C	B	D	D	B	C	B	C	B	A
Ques.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	A	D	A	D	C	D	C	A	D	B	C	A	C	D	B
Ques.	31	32	33	34	35	36	37	38	39	40					
Ans.	D	C	C	B	A	B	A	A	D	B					

PART - A (1 Mark)

MATHEMATICS

1. $\sqrt{x+5} \geq 0$ $\quad\therefore\ 1-x \geq 0$

$x < 1$ ...(i)

$\sqrt{x+5} > 1 - x$

$x + 5 > 1 + x^2 - 2x$

$x^2 - 3x - 4 < 0$

$(x - 4)(x + 1) < 0$

$x \in (-1, 4)$ ....(ii)

Using (i) & (ii) $x \in (-1, 1)$

3. $x = x^2 + y^2$ & $y = 2xy$

I when $y = 0$

$\Rightarrow \quad x = x^2$

$\Rightarrow \quad x = 0, x = 1$

$\therefore$ solutions are (0,0) (1,0)

II when $x = \frac{1}{2}$

$\Rightarrow \quad \frac{1}{2} - \frac{1}{4} = y^2 \quad \Rightarrow \quad \frac{1}{4} = y^2 \quad \Rightarrow \quad y = \pm \frac{1}{2}$

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

4. $x^3 - 3|x| + 2 = 0$ [Let $x > 0$]

$x^3 - 3x + 2 = 0$

$(x - 1)(x^2 + x - 2) = 0$

$x = 1,\ x = \frac{-1+\sqrt{9}}{2} = 1$

Now, let $x < 0$

$x^3 + 3x + 2 = 0$

no solution

$x = 1$ only one solution

5. $(1 + 2x)^{20} = a_0 + a_1x + a_2x^2 + \text{-------} + a_{20}x^{20}$

put $x = 1$ $\quad 3^{20} = a_0 + a_1 + a_2 + \text{-------} + a_{20}$

$x = -1$ $\quad 1 = a_0 - a_1 + a_2 - a_3 \text{ -------} + a_{20}$

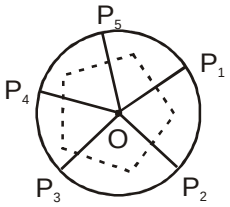
subtract $\quad 3^{20} - 1 = 2(a_1 + a_3 + \text{--------} + a_{19}]$

add $\quad 3^{20} + 1 = 2(a_0 + a_2 + \text{--------} + a_{20}]$

$$2(a_1 + a_3 + \text{-------} + a_{19}) + 3[a_0 + a_2 + \text{---------} + a_{20}] = (3^{20}-1) + \frac{3}{2}(3^{20}+1)$$

$$= \frac{5.3^{20}+1}{2}$$

6. Points which are equidistant from O and P_1 lies on perpendicular bisector of OP_1



Similarly for others

$\therefore$ In figure points on pentagon are equdistant from points P_1, P_2, ... and O

$\therefore$ interior region of pentagon is closed to 'O'

7. Let (x, y) be any point

Using given condition $2\sqrt{(x-2)^2+y^2} < 3\sqrt{(x-0)^2+(y-3)^2}$

$5x^2 + 5y^2 - 54y + 16x + 65 > 0$

$x^2 + y^2 - 10.8y + 3.2x + 13 > 0$

It is a circle, radius = $\sqrt{18.72}$

Centre (– 1.6, 5.4)

Hence region is exterior of $(x + 1.6)^2 + (y - 5.4)^2 = 18.72$.

8. $(r + 3)^2 + (r + 10)^2 = (13)^2$

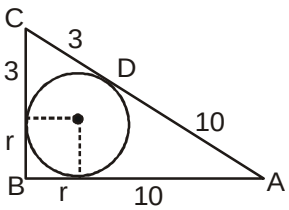
=> $r^2 + 9 + 6r + r^2 + 100 + 20r = 169$

=> $2r^2 + 26r - 60 = 0$

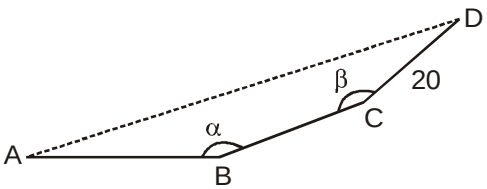
=> $r^2 + 13r - 30 = 0$

=> $(r + 15)(r - 2) = 0$

=> $r = 2$



9. To find possible intergal value of 4th sier minimum possible value of 4th side greater than 0 is 1.
For maximum possible value.



let angle α, β are slightly smaller than 180°

if α, β = 180°

AD = 35

$\therefore$ maximum value of 4th side is 34

$\therefore$ 1, 2, 3, ---------- 34 are possible value of 4th side

$\therefore$ 34 values are possible.

10. $\frac{V'}{V} = \frac{172.8}{100} = \frac{\frac{4}{3}\pi R'^3}{\frac{4}{3}\pi R^3}$

$\frac{R'}{R} = 1.2$

Now, ratio of surface area = $\frac{S'}{S} = \frac{4\pi R'^2}{4\pi R^3} =$

$= \frac{S'}{S} = 1.44$

Hence surface area increased by 44%

PHYSICS

12. given mass of planet A = m_A
and mass of planet B = m_B
$m_B = 8\ m_A$

$g_A = \frac{Gm_A}{r_{A^2}}$ and $g_B = \frac{Gm_B}{r_{B^2}}$

or $\frac{g_A}{g_B} = \frac{m_A}{m_B}\left(\frac{r_B}{r_A}\right)^2$ .....(i)

$\because\ m_B = 8\ m_A$

$\frac{4}{3}\pi r_B^3 d = 8\left(\frac{4}{3}\pi r_A^3 d\right) \quad \Rightarrow \frac{r_B}{r_A} = 2$

$\frac{g_A}{g_B} = \frac{1}{8} \times 4 = \frac{1}{2}$

$g_B = 2g_A$

20. $A = \pi r^2$

$\frac{\Delta A}{A} = 2\frac{\Delta A}{r}$

$\frac{\Delta A}{A}\% = 2\left(\frac{\Delta A}{r}\right) \times 100$

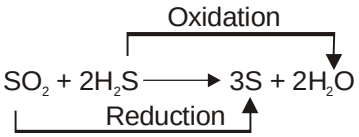
$\frac{\Delta A}{A}\% = 2 \times 0.15 = 0.30\%$

CHEMISTRY

21. Silicon is tetravalent, so it forms $SiCl_4$.

22. NH_4Cl undergoes sublimation while NaCl does not.

24.



26. As per Boyle's law
PV = constant

and $P \propto \frac{1}{V}$

28.

CaC_2	+	$2H_2O$ ⟶	$Ca(OH)_2$	+	C_2H_2
Calcium carbide		Water	Calcium hydroxide		Ethyne (acetylene)

29. As we move downwards in a group, atomic radii increases. So the order will be Li < Na < K < Cs.

30. $CH_3 - C \equiv CH$ (Propyne) and  (cyclo propene) are two possible structural isomers of C_3H_4.

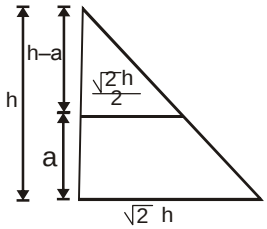
DESCRIPTIVE TYPE ANSWER

PART - B (5 Mark)

MATHEMATICS

1.

$$\frac{h-a}{h} = \frac{\frac{\sqrt{2}a}{2}}{\sqrt{2}h}$$



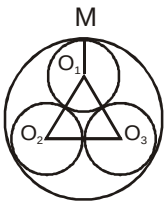
$$\frac{h-a}{1} = \frac{a}{2}$$

$2h - 2a = a$

$2h = 3a$

$$\frac{\text{volume of cone}}{\text{volume of cube}} = \frac{\frac{1}{3}\pi r^2 h}{a^3} = \frac{\frac{1}{3}\pi(\sqrt{2}h)^2 h}{\left(\frac{2h}{3}\right)^3} = 2.25$$

2.



$O_1O_2 = O_2O_3 = O_3O_1 = 1 + 1 = 2$ unit

Height of equilateral triangle $O_1 O_2 O_3$

$$= \frac{\sqrt{3}}{2} \times 2 = \sqrt{3} \text{ unit.}$$

Centre of the bigger circle O will be the centroid of the triangle.

$$O_1O = \frac{\sqrt{3} \times 2}{3} = \frac{2}{\sqrt{3}}.$$

So, the radius of bigger circle

$$= \left(1 + \frac{2}{\sqrt{3}}\right) = \left(\frac{\sqrt{3}+2}{\sqrt{3}}\right)$$

Hence, area of the bigger circle

$$= \pi\left(\frac{\sqrt{3}+2}{\sqrt{3}}\right)^2$$

$$= \frac{\pi}{3}(2+\sqrt{3})^2 \text{ sq. unit}$$

3. $\left(2^3\right)^{4^5} - \left(2^3\right)^{5^4}$

Now as $4^5 > 5^4$

{for $x > 2, (x)^{x+1} > (x+1)^x$ always }

$\therefore \quad 2^{3^{4^5}} > 2^{3^{5^4}}$

Now all even power of 3 are of the form 4n + 1

$\therefore$ last term of first digit is 2

also all odd powers of 3 are of the form 4n + 3.

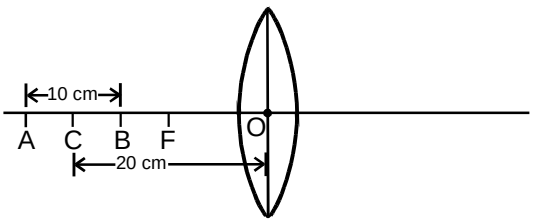
$\therefore$ last digit of the term is 8

[$\because$ By cyclicity of last digit]

Thus, the last digit of expression 2 – 8 = 4.

PHYSICS

4.



In the given figure AB is the needle of length 10 cm.

CO = 20 cm, AO = 25 cm, BO = 15 cm

For the image of end A of the needle:

$u_1 = -25$ cm, $f = 10$ cm.

$$\Rightarrow \frac{1}{v_1} - \frac{1}{u_1} = \frac{1}{f} \Rightarrow \frac{1}{v_1} = \frac{1}{10} + \frac{1}{-25} \Rightarrow \frac{1}{v_1} = \frac{1}{10} - \frac{1}{25} \Rightarrow \frac{1}{v_1} = \frac{3}{50}$$

$\Rightarrow v_1 = 16.67$ cm

For the image of end B of the needle:

$u_2 = -15$ cm, $f = 10$ cm.

$$\Rightarrow \frac{1}{v_2} - \frac{1}{u_2} = \frac{1}{f}$$

$$\Rightarrow \frac{1}{v_2} - \frac{1}{-15} = \frac{1}{10} \qquad \Rightarrow \frac{1}{v_2} = \frac{1}{10} - \frac{1}{15}$$

$$\frac{1}{v_2} = \frac{1}{30} \Rightarrow v_2 = 30 \text{ cm}$$

Size of image of the needle AB = $v_2 - v_1$

= 30 – 16.67 = 13.33 cm.

5. $$\frac{\text{Volume inside water(u)}}{\text{Total volume(v)}} = \frac{\text{Density of ice}}{\text{Density of sea water}}$$

$$\frac{u}{v} = \frac{0.92}{1.03}$$

$$\frac{u}{v} - 1 = \frac{0.92}{1.03} - 1$$

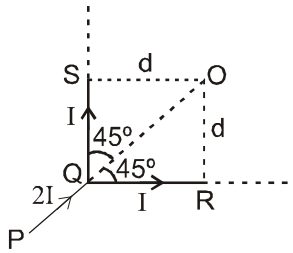
$$\frac{(u-v)}{v} = \frac{92-103}{103}$$

or $$\frac{(u-v)}{v} = \frac{11}{103}$$

$$\frac{\text{Volume out side water}}{\text{Total volume}} = \frac{11}{103} \times 100\% = \frac{1100}{103} \simeq 11\%$$

6. Magneitc field due to straight wire
PQ at O,
$B_1 = 0$
Magnetic field due to straight wire QR at O

$$B_2 = \frac{\mu_0 I}{4\pi d}(\sin\theta_1 + \sin\theta_2)$$



Here $\theta_1 = 45°$ and $\theta = 90°$

$$B_2 = \frac{\mu_0 I}{4\pi d}\left(\frac{1}{\sqrt{2}} + 1\right)\odot$$

Magnetic field due to were QS at O

$$B_3 = \frac{\mu_0 I}{4\pi d}(\sin\theta_1 + \sin\theta_2)$$

Here $\theta_1 = 45°$ and $\theta_2 = 90°$

So, $$B_3 = \frac{\mu_0 I}{4\pi d}\left(\frac{1}{\sqrt{2}} + 1\right)\otimes$$

Net magnetic field at O
$B = B_1 + B_2 + B_3 = 0$

7. Molarility of Ag_2CrO_4 solution.

$Ag_2CrO_4(s) + aq \rightleftharpoons 2Ag^+(aq) + CrO_4^{2-}(aq)$

Let the solubility of Ag_2CrO_4 in water be S mol litre^{-1}. Then

$[Ag^+(aq)] = 2S$ and $[CrO_4^{2-}(aq)] = S$

Now, $K_{sp} = [Ag^+(aq)]^2[CrO_4^{2-}(aq)] = (2S)^2 \times S = 4S^3$

or $S = \sqrt[3]{\frac{K_{sp}}{4}} = \sqrt[3]{\frac{1.1\times10^{-12}}{4}} = 0.65 \times 10^{-4}$

$= 6.5 \times 10^{-5}$ mol L^{-1}

(b) Molarity (or molar solubility) of Ag Br solution.

$AgBr(s) + aq \rightleftharpoons Ag^+(aq) + Br^-(aq)$

Let the solubility of AgBr be S mole L^{-1}. Then $[Ag^+(aq)] = S$ and $[Br^-(aq)] = S$

Now, $K_{sp} = [Ag^+(aq)][Br^-(aq)] = S \times S = S^2$

or $S = \sqrt{K_{sp}} = \sqrt{5.0\times10^{-13}}$

$= 0.707 \times 10^{-6}$ mol $L^{-1} = 7.07 \times 10^{-7}$ mol L^{-1}

$\therefore$ Ratio of molarities of the saturated solutions

$$= \frac{\text{Molarity of } Ag_2CrO_4}{\text{Molarity of AgBr}} = \frac{6.5\times10^{-5}}{7.07\times10^{-7}} = 91.9$$

8. (i) $\underset{(A)}{SnCl_2} + H_2S \longrightarrow \underset{\text{Dirty yellow}}{SnS} + 2HCl$

$SnS + (NH_4)_2S_2 \longrightarrow SnS_2 + (NH_4)_2S$

$SnS_2 + (NH_4)_2S_2 \longrightarrow \underset{\text{Soluble}}{(NH_4)_2SnS_3}$

(ii) $SnCl_2 + H_2SO_4 \longrightarrow SnSO_4 + 2HCl$

$K_2Cr_2O_7 + H_2SO_4 \longrightarrow K_2SO_4 + 2CrO_3 + H_2O$

$CrO_3 + 2HCl \longrightarrow \underset{\text{Chromyl chloride}}{CrO_2Cl_2} + H_2O$

(iii) $SnCl_2 + 2NaOH \longrightarrow \underset{\text{White ppt.}}{Sn(OH)_2} + 2NaCl$

$Sn(OH)_2 + 2NaOH \longrightarrow \underset{\substack{(B)\\ \text{Soluble}}}{Na_2SnO_2}$ (Sodium stannite)

(iv) $\underset{(B)}{3Na_2SnO_2} + 6NaOH + 2BiCl_3 \longrightarrow \underset{\substack{(C)\\ \text{Black ppt.}}}{2Bi} + 3Na_2SnO_3 + 6NaCl + 3H_2O$

(v) $SnCl_2 + 2HgCl_2 \longrightarrow \underset{\substack{(D)\\ \text{White ppt.}\\ \text{(Mercurouschloride)}}}{Hg_2Cl_2} + SnCl_4$

$HgCl_2 + SnCl_2 \longrightarrow \underset{\text{Grey}}{2Hg} + SnCl_4$

9. [Hints : (i) (X) is SO_2. It is colourless and pungent. Rest of properties are observed with SO_3.

(ii) $Ca(OH)_2 + SO_2 \longrightarrow CaSO_3 + H_2O$
Lime water Milky

(iii) $K_2Cr_2O_7 + H_2SO_4 + 3SO_2 \longrightarrow K_2SO_4 + Cr_2(SO_4)_3 + H_2O$
Green

(iv) $SO_2 + 2H_2S \longrightarrow 3S + 2H_2O$
White
turbidity

(v) $H_2SO_3 + 2NaOH \longrightarrow Na_2SO_3 + 2H_2O$

$Na_2SO_3 + BaCl_2 \longrightarrow BaSO_3 + 2NaCl$

$Br_2 + H_2O \longrightarrow 2HBr + [O]$

$BaSO_3 + [O] \longrightarrow BaSO_4$
White ppt.
(Insoluble in conc. HNO_3)

BIOLOGY

10. **(a)** plasmodesmata. Due to this the sieve tube cells which lacks nucleus at maturity remains alive through cytoplasmic transfer from companion cells.

(b) System of classification based on evolutionary relationships of organism.

(c) Both posses mammary glands and diaphragm which is characteristic feature of mammals.

(d) A group of symptoms that collectively indicate or characterize a disease, psychological disoder or other abnormal condition is called syndrome.

(e) Interferons are specific type of proteins which are released by virus infected cells during viral infection and stops further multiplication of virus in body.

11. **(i)** Lizard and leech
(ii) Annelids
(iii) Bile juice
(iv) Pepsin & trypsin.
(v) Root like structures are called Rhizoids.

12. **(i)** Genetics **(ii)** Alleles **(iii)** Waldeyer
(iv) Idiograms **(v)** Entomophily