IIT ASHRAM BRINGS....

UDAAN (2020)

ANSWER KEY AND SOLUTION

CLASS - 10

Mental Ability		Mathematics		Physics & Chemistry		Biology	
Q. No.	Ans	Q. No.	Ans	Q. No.	Ans	Q. No.	Ans
1	C	1	C	1	D	1	D
2	D	2	B	2	D	2	D
3	A	3	B	3	D	3	A
4	B	4	B	4	C	4	C
5	A	5	C	5	B	5	D
6	B	6	D	6	A	6	C
7	C	7	C	7	C	7	B
8	C	8	A	8	A	8	C
9	A	9	B	9	C	9	D
10	B	10	C	10	A	10	C
11	C	11	D	11	A	11	D
12	C	12	D	12	B	12	D
13	A	13	C	13	B	13	A
14	C	14	B	14	B	14	D
15	B	15	D	15	C	15	C
16	A	16	A	16	A	16	D
17	D	17	A	17	B		
18	A	18	C	18	B		
19	D	19	B	19	A		
20	C	20	B	20	B		
		21	A	21	A		
		22	C	22	A		
		23	A	23	C		
		24	A	24	D		
		25	C	25	B		
		26	D	26	D		
		27	C	27	D		
		28	A	28	B		
		29	C	29	C		
		30	D	30	B		
				31	B		
				32	A		
				33	B		
				34	B		

PART - I
MENTAL ABILITY

1. (C)

Sol. In the given codes, the numbers are coded as shown :

1 5 7 8 9 2 3 4 6

E G K P T A L U R

i.e., 2 as A, 3 as L, 5 as G, 4 as U and 9 as T. so, 23549 is coded as ALGUT.

2. (D)

Sol. Clearly, the given series consists of alternate letters in a reverse order. So, the missing terms would be P and N.

3. (A)

Sol. In all the pairs except (A), the first number is a multiple of the second. Henc e, the answer is (A)

4. (B)

Sol. Putting the proper signs in the given expression, we get :

$16 + 8 \times 4 \div 2 - 4 = 16 + 16 - 4$

$= 32 - 4 = 28.$

So, the answer is (b),

5. (A)

Sol. The only son of Bhaskar's father is the Bhaskar himself. This means that Bhaskar is the father of Asha. Hence, Asha is the daughther of Bhaskar. Therefore, answer is (A).

6. (B)

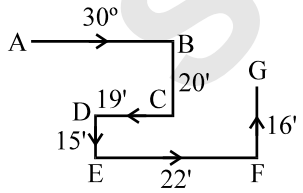
Sol. From the properties of the clock we know that hands of a clock coincide once in every hour but between 11 o' clock and 1 o' clock they coincide only once. Therefore, the hands of a clock coincide 11 times in every 12 hours. Hence they will coincide (11 × 2) 22 times in 24 hours. So our answer is (B).

7. (C)

Sol. The place of work of 'Sailor' is 'Ship'. Similarly the place where 'Lawyer' works is 'Court'. So, the answer is (C).

8.

Sol. (C)



The movement of the rabbit from A to G are as show in figure. So, the rabbit's face is in North direction at the end of runs.

9. (A)

Sol. From the relationship given in the question, we observe that each of the objects carries something in common to one another. A tennis fan can be a Cricket player as well as student. Hence diagram (a) represents this relationship. So our answer is (a).

10. (B)

$9 \times 3 + 3 = 30$, $7 \times 7 + 6 = 55$, $8 \times 3 + 7 = 31$

11. (C) 24, 48, 96

12. (C) $3 \times 3 + 1 = 10$, $10 \times 10 + 1 = 101$,

$101 \times 101 + 1 = 10202$

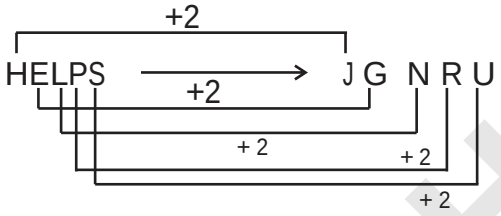
13. (A) 33, 28, 24, 21, 19, 18

-5 -4 -3 -2 -1

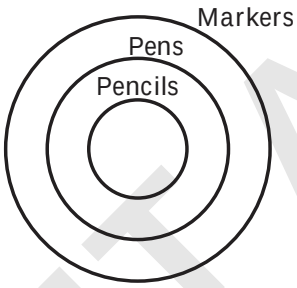
14. (C) C

15. (B) 24

16. (A)



17. (D)



18. (A)

19. (D) 17

20. (C) Tuesday

PART - II
MATHEMATICS

1. (C)

Lines coinudes i.e., infinite solutions.

So, $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$

$\frac{2}{3}=\frac{k1}{k}=\frac{3}{a/2}$

$\frac{2}{3}=\frac{1}{k}$

$\therefore \boxed{k=\frac{3}{2}}$

2. (B)

$2^x=2^{3y+3}$ and $3^{2y}=3^{x-9}$

$\therefore$ $x-3y=3$ and $2y=x-9$

$x-3y=3$

$x-2y=9$

$-y=-6$

$\boxed{y=6}$ and $\boxed{x=21}$

3. (B) Let unit digit be 'x'

and tens digit be '$(7-k)$'

so Number is $10\ (7-k)+x = 70-9x$

New Number $10x + (7-k) = 9x + 7$

So, $(70-9x)=9x+7+9$

$70-16=18x$

$54=18x$

$\boxed{x=3}$

$\therefore$ Number is $10\ (7-3)+3 = 40+3=43$

4. (B) Let speed of X be 'u'

and speed of Y be 'v'

and distance travelled by them is 'd'.

So, Acc. to Ques.

$T_x=3+T_y$

$\frac{d}{u}=3+\frac{d}{v}$

$\frac{d}{4}-\frac{d}{v}=3$ -------(1)

$T_x = T_y - \frac{3}{2}$

$\frac{d}{24} = \frac{d}{v} - \frac{3}{2}$

$\frac{d}{v} - \frac{d}{24} = \frac{3}{2}$ -------(2)

Solving (1) and (2)

So, speed of '1/' is 5 km/hr

5. (C)

Let, $f(x) = \left(2x^2 + 3x + 1\right)$

$q(x) = (2x - 1)$ $r(x) = r$

By applying euclid's division Algorithm,

$f(x) = g(x)\, q(x) + r(x)$

$\left(2x^2 + 3x + 1\right)$ = g(x) $(2x - 1)$

and Let g(x) = a x + b

So, $\left(2x^2 + 3x + 1\right) = (ax + b)\,(2x - 1) + r$

Solving above equation we get,

a = 1 b = 2 and r = 3

i.e. g(x) = ax + b = (x + 2)

i.e. r (x) = 4 = 3

6. (D)

7. (C)

$$a + b = \frac{\sqrt{5}+1}{\sqrt{5}-1} + \frac{\sqrt{5}-1}{\sqrt{5}+1} = \frac{12}{4} = 3$$

a + b = 3

and

$$ab = \frac{\left(\sqrt{5}+1\right)}{\left(\sqrt{5}-1\right)} \times \frac{\left(\sqrt{5}-1\right)}{\left(\sqrt{5}+1\right)} = 1$$

So, $\frac{\left(a^2 + b^2 + ab\right)}{\left(a^2 + b^2 - ab\right)} = \frac{(9-1)}{(9-3)} = \frac{4}{a-3} = \frac{8}{6} = \frac{4}{3}$

8 (A) According to Ques.

$$\frac{15 + 5 + x}{3} = \frac{x + 16 + 17}{4}$$

$$\frac{(20+x)}{3} = \frac{(x+33)}{4}$$

80 + 4x = 3x + 99

$\boxed{x = 19}$

9. (B)

$S_{11} = \frac{11}{2}\left[2a + 10d\right]$

$a_6 = a + 5d = 30$

$S_{11} = \frac{11}{2} \times 2\left[a + 5d\right]$

$\boxed{S_{11} = 11 \times 30 = 330}$

10. (C)

Since Centroid G_1 $\left[\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right]$

Let be (h, k)

So, $O = \frac{-1 + 5 + b}{3}$ and $-3 = \frac{4 + 2 + k}{3}$

h = -4 -15 = k

$\therefore$ $C\left(-4, -15\right)$

11. (D)

In ΔBOC, $\because$ OC=OB=Radius, then

$\angle BOC + \angle OCB + \angle OBC = 180^0$

$\angle BOC + 55^0 + 55^0 = 180^0$

$\therefore \angle BOC = 70^0$

12. (D)

Sol. $\frac{4^n \times 20^{m-1} \times 12^{m-n} \times 15^{m+n-2}}{16^m \times 5^{2m+n} \times 9^{m-1}} = \frac{2^{2n} \times 2^{2m-2} \times 5^{m-1} \times 2^{2m-2n} \times 3^{m-n} \times 3^{m+n-2} \times 5^{m+n-2}}{2^{4m} \times 5^{2m+n} \times 3^{2m-2}}$

$= 2^{2n + 2m - 2 + 2m - 2n - 4m} \times 3^{m - n + m + n - 2 - 2m + 2} \times 5^{m - 1 + m + n - 2 - 2m - n}$

$= 2^{-2} \times 3^0 \times 5^{-3} = \frac{1}{4} \times \frac{1}{125} = \frac{1}{500}$

13. (C)

Sol. $AC^2 = AB^2 + BC^2 = 6^2 + 8^2 = 100 \Rightarrow$ AC = $\sqrt{100}$ = 10 cm

Area = $\frac{1}{2}$ × base × length

$\frac{1}{2} \times AB \times BC = \frac{1}{2} AB \times OZ + \frac{1}{2} \times BC \times OX + \frac{1}{2} \times AC \times OY$

$\frac{1}{2} \times 6 \times 8 = \frac{1}{2} \times 6 \times r + \frac{1}{2} \times 8 \times r + \frac{1}{2} \times 10 \times r$

$24 = 3r + 4r + 5r \Rightarrow 12r = 24 \Rightarrow r = 2$ cm

14. (B)

Sol. Let the capacity of drum be x, then $\frac{3}{4}x-15=\frac{7}{12}x \Rightarrow \frac{9x-7x}{12}=15 \Rightarrow x = 90$

Alternatively : If you consider option (b) then $90\times\frac{3}{4}-15=90\times\frac{7}{12}$

Alternatively : The decrease in amount = $\frac{x}{6}=15 \Rightarrow$ x = 90 litre.

15. (D)

Sol. $\sin^4\theta+\cos^4\theta=\frac{1}{2}$

$\left(\sin^2\theta\right)^2+\left(\cos^2\theta\right)^2=\frac{1}{2}$

$\left(\sin^2\theta+\cos^2\right)^2-2\sin^2\theta\cos^2\theta=\frac{1}{2}$

$-2\sin^2\theta\cos^2\theta=\frac{1}{2}-1$

$-\sin^2\theta\cos^2\theta=\frac{-1}{4}$

$\sin\theta\cos\theta=\pm\frac{1}{2}$

16. (A)

Sol. Let the numbers be 3x, 4x and 5x
3x + 5x = 24 $\Rightarrow$ x = 3
Sum of all the numbers = 12x = 36

17. (A)

Sol. Let the cost of one chair and one table be Rs. C and Rs. T respectively.
4C + 3T = 1800 ..... (1)
5C + 4T = 2300 ..... (2)
{(2) × 3} – {(1) × 4} we get C = 300
Cost of each their = Rs. 300

18. (C)

Sol. Since the sum of any two sides of a triangle is greater than the third side.
Therefore, in ΔPQR, we have

PQ + QR > PR .... (i)

In Δ RSP, we have

RS + SP > PR .... (ii)

In ΔPQS, we have

PQ + SP > QS .... (iii)

In ΔQRS, we have

QR + RS > QS .... (iv)

Adding (i), (ii), (iii) and (iv), we get

2 (PQ + QR + RS + SP) > 2 (PR + QS)

$\Rightarrow$ PQ + QR + RS + SP > PR + QS.

This proves (i).

Now, in ΔOPQ, we have

$$OP + OQ > PQ \quad \ldots. \text{(v)}$$

In ΔOQR, we have

$$OQ + OR > QR \quad \ldots. \text{(vi)}$$

In ΔORS, we have

$$OR + OS > RS \quad \ldots. \text{(vii)}$$

In ΔOSP, we have

$$OS + OP > SP \quad \ldots. \text{(viii)}$$

Adding (v), (vi), (vii) and (viii), we get

$$2 (OP + OQ + OR + OS) > PQ + QR + RS + SP$$

$$\Rightarrow 2 \{(OP + OR) + (OQ + OS)\}$$

$$> PQ + QR + RS + SP$$

$$\Rightarrow 2 (PQ + QS) > PQ + QR + RS + SP$$

$$\left[\begin{array}{l} \because OP + OR = PR \\ \text{and } OQ + OS = QS \end{array}\right]$$

$$\Rightarrow PQ + QR + RS + SP < 2 (PR + QS)$$

This proves (ii).

19. (B)

Sol. Given. AB and CD are two parallel chords of a circle, which are on opposite sides of the centre.

AB = 10 cm, CD = 24 cm.

Distance between AB and CD = 17 cm

To find. Radius = ?

Construction. Draw $OP \perp AB$ and $OQ \perp CD$. Join OB and OD.

Procedure. Since, AB || CD and $OP \perp AB$, $OQ \perp CD$

$\therefore$ Points P, O and Q are collinear

Let OP = x cm Then, OQ = (17 – x)cm

$$PB = \frac{10}{2} = 5\text{cm}$$

($\therefore$ $\perp$ from the centre bisects the chord) $QD = \frac{24}{2} = 12\text{cm}$

($\therefore$ $\perp$ from the centre bisects the chord)

In rt. ΔOPB, $r^2 = x^2 + 5^2$ ....(1)

(By pythagoras theorem)

In rt.ΔOQD, $r^2 = (17 - x)^2 + 12^2$ ....(2)

From (1) and (2), we have

$$x^2 + 25 = (17 - x)^2 + 12^2$$

$$\Rightarrow \quad x^2 + 25 = 289 + x^2 - 34x + 144$$

$$\Rightarrow \quad x^2 - x^2 + 34x = 289 + 144 - 25$$

$$\Rightarrow \quad 34x = 408 \Rightarrow x = 12 \text{ cm}$$

Using the value of x in (1), we get.

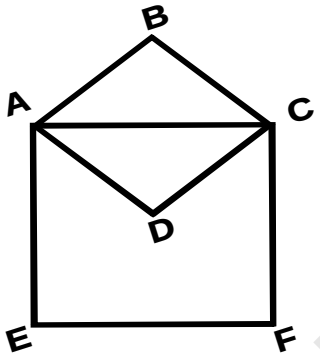
$$r^2 = 12^2 + 5^2 = 144 + 25 = 169$$

$\therefore$ Radius r = 13 cm ($\therefore$ radius can't be – ve).

20. (B)

Sol. Area of ABCD = 108 m^2, length = 12 m.

$\therefore$ $l \times b = 108 \Rightarrow$ breadth (b) = 9 m



$\therefore$ AC = $\sqrt{AD^2 + DC^2} = \sqrt{81+144}$ = 15 m

$\therefore$ Side of the square AEFC = 15 m

$\therefore$ Area of the square AEFC = 15 × 15 = 225 sq.m

21. (A)

Sol . Let $f(x + 3) = q_0x^4 + q_1x^3 + q_2x^2 + q_3x + q_4$

Then q_1, q_2, q_3, q_4 are the remainders of f(x) when divided by $(x – 3)^4$, $(x – 3)^3$, $(x – 3)^2$, (x – 3) respectively and $q_0 = 1$

$\therefore$ Divide f(x) successively by (x – 3) as follows.

	1	–12	17	–9	7
3	–	3	–27	–30	–117
	1	–9	–10	–39	–110 $\longrightarrow q_4$
3	0	3	–18	–84	
	1	–6	–28	–123 $\longrightarrow q_3$	
3	0	3	–9		
	1	–3	–37 $\longrightarrow q_2$		
3	0	3			
	1	0 $\longrightarrow q_1$			

$\therefore$ $f(x + 3) = x^4 – 37x^2 – 123x – 110$

22. (C)

Sol. $x = 3 + 3^{\frac{1}{3}} + 3^{\frac{2}{3}}$

$x - 3 = 3^{\frac{1}{3}} + 3^{\frac{2}{3}}$

$(x-3)^3 = \left(3^{\frac{1}{3}} + 3^{\frac{2}{3}}\right)^3$

$x^3 - 3.x^2.3 + 3.x.3^2 - 3^3 = \left(3^{\frac{1}{3}}\right)^3 + 3.3^{\frac{1}{3}}3^{\frac{2}{3}}\left(3^{\frac{1}{3}} + 3^{\frac{2}{3}}\right) + \left(3^{\frac{2}{3}}\right)^3$

$x^3 – 9x^2 + 27x – 27 = 3 + 9(x – 3) + 9$

$x^3 – 9x^2 + 27x – 27 – 12 – 9x + 27 = 0$

$x^3 – 9x^2 + 18x – 12 = 0$

23. (A)

Sol. $AD^2 + CD^2 = AC^2$

$AD^2 + (3BD)^2 = AC^2$

$AD^2 + 9BD^2 = AC^2$

$AD^2 + BD^2 + 8BD^2 = AC^2$

$$AB^2 + 8 \times \left(\frac{1}{4}BC\right)^2 = AC^2$$

$$AB^2 + 8 \times \frac{1}{16} \times BC^2 = AC^2$$

$$\frac{2AB^2 + BC^2}{2} = AC^2 \qquad 2AB^2 + BC^2 = 2AC^2$$

24. (A)

$ax^2 - 2bx + c = 0$

α, β are the roots of above equation, then

$$\alpha + \beta + \frac{2b}{a} \quad \text{and} \quad \alpha\beta\frac{c}{a}$$

$$\alpha^3\beta^3 + \alpha^2\beta^3 + \alpha^3\beta^2$$

$$\Rightarrow \alpha^2\beta^2(\alpha\beta + \beta + \alpha)$$

$$\Rightarrow \left(\frac{c}{a}\right)^2\left[\frac{c}{a} + \frac{2b}{a}\right]$$

$$\Rightarrow \frac{c^2}{a^2} \times \frac{(c+2b)}{a}$$

$$\Rightarrow \frac{c^2(c+2b)}{a^3}$$

25. (C)

We can write,

$$\frac{x-a}{b+c} - 1 + \frac{x-b}{c+a} - 1 + \frac{x-c}{a+b} - 1 = 0$$

$$\frac{x-a-b-c}{(b+c)} + \frac{x-b-c-a}{(c+a)} + \frac{x-c-a-b}{(a+b)} = 0$$

$$\frac{x-(a+b+c)}{(b+c)} + \frac{x-(a+b+c)}{(c+a)} + \frac{x-(a+b+c)}{(a+b)} = 0$$

$$x-(a+b+c)\left\{\frac{1}{b+c} + \frac{1}{c+a} + \frac{1}{a+b}\right\} = 0$$

$$\therefore \{x-(a+b+c)\} = 0 \text{ and } \frac{1}{b+c} + \frac{1}{c+a} + \frac{1}{a+b} = 0$$

$\therefore x = a+b+c$

26. (D)

Circumference of circle = $2\pi r$

Ace to Ques.

$2\pi r = 4\pi$

r = 2 and $2\pi r = 8\pi$

R = 4

$\therefore$ Initially Area was $\pi(2)^2 = 4\pi$

final area was $\pi(4)^2 = 16\pi$

$\therefore$ Final Area was four times initial area.

27. (C)

$\because$

$l \times h = x$ -------(1)

$b \times h = y$ -------(2)

$l \times b = z$ -------(3)

Multi plying all

$l^2 b^2 h^2 = xyz$

$l \times b \times h = \sqrt{xyz}$

$\therefore Volume = \sqrt{xyz}$

28. (A)

Let the total terms be n = 2 k + 1

let the A.P. be

S_1 = a + a + d + a + 2d + a + 3d + ...a + 2 k

Ace. to Sn identity,

$$S_1 = \frac{(2k+1)}{2}\left[a + a + 2kd\right]$$

S_1 = (2k + 1) (a + kd) --- (1)

Also, S_2 = a + a + 2d + a + 4d + a + 6d +.....a+2

$$S_2 = \frac{(k+1)}{2}\left[a + a + 2kd\right]$$

$$S_2 = (k+1)(a+kd) \quad \text{--- (2)}$$

Dividing (1) and (2)

So, $$\frac{S_1}{S_2} = \frac{(2k+1)(a+kd)}{(k+1)(a+kd)}$$

$$\therefore \frac{S_1}{S_2} = \frac{2k+1}{k+1} \quad \text{--- (3)}$$

But n = 2k + 1

$$\therefore \boxed{\frac{S_1}{S_2} = \frac{2n}{(n+1)}}$$

29. (C)

$2^{3x^2-7x+4} = 2^0$

$3x^2 - 7x + 4 = 0$

$3x^2 - 3x - 4x + 4 = 0$

$3x(x-1) - 4(x-1) = 0$

$(x-1)(3x-4) = 0$

x = 1, 4/3

$\therefore$ There are two real solutions.

30. (D)

Ratio of volumes of spheres $\frac{V_1}{V_2} = \frac{8}{27}$

$$\frac{\frac{4}{3}\pi r_1^3}{\frac{4}{3}\pi r_2^3} = \frac{8}{27}$$

$$\left(\frac{r_1}{r_2}\right)^3 = \frac{8}{27} \Rightarrow \boxed{\frac{r_1}{r_2} = \frac{2}{3}}$$

$\therefore$ Ratio of surface areas i.e. $\frac{4\pi r_1^2}{4\pi r_2^2}$

$$= \frac{4\pi(2x)^2}{4\pi(3x)^2} = \frac{4x^2}{9x^2} = \frac{4}{9}$$

PART - III
PHYSICS/CHEMISTRY

1. (D) given $R = 0.96\,R$

$$g = \frac{GM}{R^2} \quad g^1 = \frac{GM}{\left(R^1\right)^2} \quad \frac{g^1}{g} = \frac{R^2}{\left(R^1\right)^2}$$

$$\frac{g^1}{g} = \frac{R^2}{(0.96)^2 R^2} \Rightarrow \frac{g^1}{g} = \frac{1}{(0.96)^2}$$

change value of gravity

$$\left[\frac{g^1 - g}{g}\right] \times 150 = \left[\frac{1}{(0.96)^2} - 1\right] \times 100 = 8\%$$

2. (D)

3. (D) P = + 2.5 D

$$f = \frac{1}{P} = \frac{1}{2.5} = 0.4\,m$$

f = 40 cm convex lens.

4. (D) As magnetic force is perpendicular to motion of the particle, it will move in circular path. Option **C** is correct.

5. (B) 4 = 0 m/s

$5 = 0.4$ m
$t = 4s$

$$S = ut + \frac{1}{2} at^2$$

$$0.4 = 0 + \frac{1}{2} \times a \times 16$$

$$\frac{0.4 \times 2}{16} = a$$

$$\boxed{a = 0.05 \text{ m/s}^2}$$

now $a = 0.05$ m/s^2
$u = 0$ m/s
$5 = 0.1$ m

$$S = ut + \frac{1}{2} at^2$$

$$0.1 = 0 + \frac{1}{2} \times 0.05 \times t^2$$

$$\frac{0.2}{0.05} = t^2$$

$t^2 = 4$
$t = 2s$
Option **B** is correct.

6. (A) As pressure increases with increase in depth of water from free surface option **A** is correct.

7. (C) Optical density of medium depends on speed of light in that medium.

8. (A)

9. (C)

10. (A) From Right hand rule
Ist quadrant - zero
IInd quadrant - outward
IIInd quadrant - zero
IVth quadrant - inward

11. (A)
As balls has equal weight the downward force on all balls will be equal while upward buoyant force will be maximum in ball 1. If ball 2 sinks that means ball 1 will definitely sink Option **A** is correct.

12. (B)

13. (B)

14. (B)

15. (C)

16. (A)

$5 = 125$ m, $4 = 0$ m/s

$a = 10$ m/s^2

$S = ut + \frac{1}{2} at^2$

$125 = \frac{1}{2} \times 10 \times at^2$

$t^2 = 25$

$\boxed{t = 5s}$

So, time taken by other ball to reach ground is 4 s.

$s = ut + \frac{1}{2}at^2$

$125 = 4 \times 4 + \frac{1}{2} \times 10 \times 16$

$125 = 4u + 80$

$4u = 125 - 80$

$4u = 45$

$\boxed{u = 11.25 \text{ m/s}}$

Option **A** is correct.

17. (B)

18. (B)

Element with atomic number 18 is Ar which is noble gas. So its valency is zero.

Elements with atomic number 16, 17, 18 will have different valencies.

Elements with atomic number 9, 17, 35 are halogens. So their valencies are 1. Element with atomic number 17 is chlorine, which is more electronegative than element with atomic no. 16 (sulphur) & 35 (Bromine)

19. (A)

As per periodic table $P \rightarrow Mg$, $Q \rightarrow O$, $R \rightarrow Ne$, $T \rightarrow P$, $U \rightarrow Ar$.

20. (B)

$N_2 + 3H_2 \rightleftharpoons 2NH_3 + \text{heat}$

As no. of moles are more on reactant side as per Le Chattelier's principle when pressure is increased the equilibrium will shift towards the product side and more ammonia will be produced. As the reaction is exothermic when temperature is decreased the equilibrium will shift towards product side.

21. (A)

Molar mass of sugar $C_{12}H_{22}O_{11}$ is $12 \times 12 + 22 \times 1 + 16 \times 11 = 144 + 22 + 176 = 342$ gm

No. of C atoms in 342 gm of $C_{12}H_{22}O_{11} = 12 \times 6.022 \times 10^{23}$

No. of C atoms in 1.71 gm of $C_{12}H_{22}O_{11} = \frac{12 \times 6.022 \times 10^{23}}{342} \times 1.71 = 0.361 \times 10^{23} = 3.6 \times 10^{22}$

22. (A)

Ca $(NO_3)_2 \rightarrow$ Calcium nitrate

2 moles of $Ca(NO_3)_2$ contains 12N* O atoms and 3 moles of $Ca(NO_2)_2$ also contains 12N*O atom.

Therefore x = 2, y = 3 (N* = Avagadro Number)

23. (C)

In one mole of $Al_2 (SO_4)_3$ there are 2 moles of Al^{+3} ions and 3 moles of SO_4^{-2} ions. Therefore total number of ions present in 5 moles of $Al_2 (SO_4)_3$ is 10 N of Al^{+3} and 15N of SO_4^{-3}. Therefore total number of ions is 25 N.

24. (D)

Phenolphthalein + X $\rightarrow$ Colourless solution

Methyl orange + X $\rightarrow$ Orange

If means X is neutral

Therefore litmus + X $\rightarrow$ purple, as colour of litmus in neutral solultion is purple.

25. (B)

SiO_4^{-4} valency is 4, PO_4^{-3} valency is 3.

Therefore valency of A is 4 & B is 2.

Therefore formula will be

A	SO_4	B	I
4	2	2	1
$A_2 (SO_4)_4$		B	I_2
$A (SO_4)_2$			

26. (D)
27. (D)
28. (B)
29. (C)
30. (B)
31. (B)
32. (A)
33. (B)
34. (B)

PART - IV
BIOLOGY

1. (D) About 50% energy of milk comes from fat.
2. (D) CO_2 prevent the growth of insect and pest.
3. (A) Keeping the plant in dark - boiling the leaf in ethanol - ringing the leaf with not watch adding iodine solution
4. (C) Hydra is acoelomate organism.
5. (D) Nematodes (Round worm) have dual digestive methods.
6. (C) Hypotonic solution have higher concentration at outside the cell, so the fluid will more from outside to inside the cell en it becomes turgid.
7. (B) Its root meristem because the branches like structure are fucing downward growth.
8. (C) Involuntary muscle can perform Autonomic function but Tongue performs action our will.
9. (D) Platelets are smaller than RBC and RBC (Erythrocytes) is smaller than Eosinophils cells
10. (C) The cell will be a fungal cell.
11. (D) Option (d) is correct.
12. (D) Cockroach have exoskeleton but no endoskeleton.
13. (A) Nitrogenous base pair are comes in these sequence

    A always unit with T

    G always unit with G

    So the sequence must be opposite.
14. (D) Liver secretion bile which do not have any enzymes.
15. (C) The pH of blood is 7.4.
16. (D) Fish gills perform all the above function.