SECTION A

Q. No.	(a)	(b)	(c)	(d)	Q. No.	(a)	(b)	(c)	(d)
1	☐	☐	☐	☒	16	☒	☐	☐	☐
2	☐	☒	☐	☐	17	Question dropped			
3	☐	☐	☒	☐	18	☐	☐	☐	☒
4	☐	☐	☐	☒	19	☐	☒	☐	☐
5	☐	☐	☒	☐	20	☐	☒	☐	☐
6	☐	☐	☒	☐	21	☒	☐	☐	☐
7	☐	☐	☐	☒	22	☐	☒	☐	☐
8	☐	☒	☐	☐	23	☐	☐	☒	☐
9	☒	☐	☐	☐	24	☐	☐	☐	☒
10	☐	☐	☒	☐	25	☒	☐	☐	☐
11	☒	☐	☐	☐	26	☒	☐	☐	☐
12	☐	☐	☐	☒	27	☐	☒	☐	☐
13	☒	☐	☐	☐	28	☐	☐	☒	☐
14	☒	☐	☐	☐	29	☐	☒	☐	☐
15	☐	☐	☐	☒	30	☐	☐	☒	☐

One mark have been allotted to every candidate for question no 17.

All alternative solutions have been given due consideration

SECTION B

QUESTION 31

A.

I. Total fluid if 70 % of body weight i.e. 70% of 70Kg = 49 Kg
Blood is 8% of the total fluid i.e. 8% of 49 kg = 3.92 kg
Converting kg into volume- 3920/1060 = **3.698 litres**

II. DNA in White blood cells: 7000 x 1000 x1000x 3.69 x 46

III. Weight of albumin = 7% of 3.92= 0.2744 x58%= .159kg
66000 g =1 mole
159g = 159/66000 moles

B.

Label	Composition of blood (choose between oxygenated or deoxygenated)	Direction of flow (choose between away from or towards the heart)
1	Oxygenated	Away from
2	Deoxygenated	Away from
3	Oxygenated	towards
4	Deoxygenated	towards

QUESTION 32

A.I) Al_2O_3+ 3C + $3Cl_2$ (g) → $2AlCl_3$ + 3CO (g)

II) $6FeS_2$ +$6H_2O$ +$21O_2$ → $6FeSO_4$ +$6H_2SO_4$

$2Al_2O_3.2XSiO_2$ + $6H_2SO_4$ → $2Al_2(SO_4)_3$+ $2xSiO_2$ + $6H_2O$

…… Or

$6FeS_2$+$21O_2$ +$2Al_2O_3.2XSiO_2$ → $2Al_2(SO_4)_3$+ $2xSiO_2$ + $6FeSO_4$

B. $2NaHCO_3$ → Na_2CO_3 +H_2O +$CO_{2(g)}$

2x84 22.4 L

Amt of $NaHCO_3$ equivalent to 56 mL of CO_2 at NTP = (56x168)/22400= 0.42g

Equivalent of $NaHCO_3$ present = 0.42/84= 0.005 or 5 milli eq.

The amt. of HCl consumed by $NaHCO_3$ and Na_2CO_3 in the mixture= 30.5mL of 1N HCl= 0.0305 equivalents or 30.5 milli eq.

The amt. of HCl consumed by Na_2CO_3 =30.5-5=25.5 m.e.

Hence the amt. of Na_2CO_3 present = $25.5x53x10^{-3}$g = 1.35 g

Thus amt. of NaCl in 3g of the mixture= 3-0.42-1.35= 1.23

% 0f NaCl= 41%= (1.23x100)/3

QUESTION 33

I) Sample 1) 2mg of $CaSO_4$ =$2x10^{-3}$ of $CaSO_4$= $2x10^{-3}/136$ =$1.5x10^{-5}$mol of $CaSO_4$1mol of $CaSO_4$ = 1mol of $CaCO_3$ =100g of $CaCO_3$

Therefore $1.5x10^{-5}$mol of $CaSO_4$ =$1.5x10^{-5}$ x100 = $1.5x10^{-3}$ g of $CaCO_3$

Thus, 1000g of water contains $CaSO_4$ equivalent to $1.5x10^{-3}$ g of $CaCO_3$

10^6 g (one million) of water contains =$[(1.5x10^{-3})/1000]x10^6$ = 1.5g of $CaCO_3$

Or [(2x100)/136]= 1.5g of $CaCO_3$ **(direct method)**

0.5mg of $MgCl_2$= $5x10^{-4}$ g of $MgCl_2$ = $5x10^{-4}/95$=$0.053x10^{-4}$mol of$MgCl_2$

1mol of $MgCl_2$ = 1mol of $CaCO_3$ =100g of $CaCO_3$

$0.053x10^{-4}$mol of$MgCl_2$=$0.053x10^{-4}$x 100 = $0.053x10^{-2}$ g of $CaCO_3$

10^6 g (one million) of water contains = $[(0.053x10^{-2})/1000]x10^6$ = 0.53g of $CaCO_3$

Or [(0.5x100)/95]= 0.53g of $CaCO_3$ **(direct method)**

Hence degree of hardness of sample 1 is 1.5+ 0.53= 2.03ppm

Sample 2) 3mg of $MgSO_4$ =$3x10^{-3}$ of $MgSO_4$ = $3x10^{-3}/120$ =$2.5x10^{-5}$mol of $MgSO_4$

1mol of $MgSO_4$ = 1mol of $CaCO_3$ =100g of $CaCO_3$

Therefore $2.5x10^{-5}$mol of $MgSO_4$ =$2.5x10^{-5}$ x100 = $2.5x10^{-3}$ g of $CaCO_3$

Thus, 1000g of water contains $MgSO_4$ equivalent to $2.5x10^{-3}$ g of $CaCO_3$

10^6 g (one million) of water contains = $[(2.5x10^{-3})/1000]x10^6$ = 2.5g of $CaCO_3$

Hence degree of hardness of sample 2= 2.5ppm

Or [(3x100)/120]= 2.5g of $CaCO_3$ **(direct method)**

II) $Ca(HCO_3)_2 + 2NaOH \rightarrow CaCO_3 + Na_2CO_3 + 2H_2O$

(Any one reaction either with Calcium or Magnesium)

$CaSO_4 + Na_2CO_3 \rightarrow CaCO_3 + Na_2SO_4$

$2MgCl_2 + 2Na_2CO_3 \rightarrow 2MgCO_3 + 4NaCl$

(Any two reactions either with sulphate or chloride of Calcium or Magnesium)