$$\sum_{i=1}^{6} W_{ij}^{1} X_i + B_j^{1}$$

$$\sum_{j=1}^{5} W_{jk}^{2} X_j + B_k^{2}$$

$$\sum_{k=1}^{4} W_{kl}^{3} X_k + B_l^{3}$$

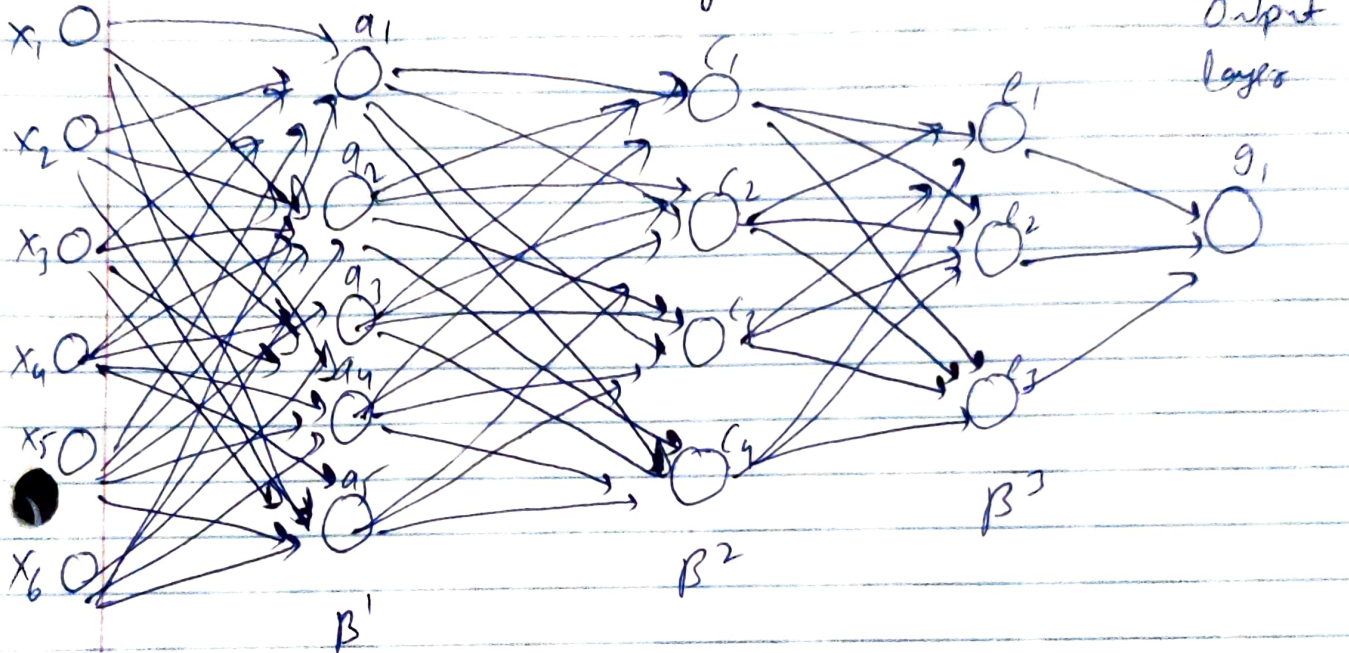Input
layer

Hidden
layer 1

Hidden
layer 2

Hidden
layer 3

$$\sum_{l=1}^{3} W_{l1}^{4} + B^{4}$$

Output
layer

x_1 q_1

x_2 q_2

x_3 q_3

x_4 q_4

x_5 q_5

x_6

B^1 B^2 B^3

g_1

Q.6.

(i) for 1st 5 hidden layers

input $= 7$
hidden layers $= 5$

total parameters $= (7+5) \times 5 = 60$

(ii) for next 5 the hidden layer has kth hidden layers

for $k=6$ it is $(5+6) \times 6 = 66$
$k=7$; $(5+7) \times 7 = 84$
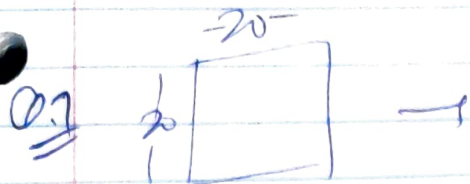$k=8$; $(5+8) \times 8 = 104$
$k=9$; $(5+9) \times 9 = 126$
$k=10$; $(5+10) \times 10 = 150$

(iii) for output layer
it has 2 neuron
$(10+2) \times 2 = \cancel{120} \ 24$

total parameters $= 614$

Q7

20

$20 \begin{array}{|c|} \hline \\ \\ \hline \end{array} \longrightarrow$

Conv 2D
$f = (5,5)$
filter = 6
stride = $(3,3)$
Padding = 5

$n_H =$

$$\left[\frac{n_{H,\,\text{prv}} + 2p - f}{\text{stride}} + 1 \right]$$

$$n_H = \left[\frac{n_{H\,\text{prv}} - f + 2 \times \text{padding}}{\text{stride}} \right] + 1$$

$$= \left[\frac{20 - 5 + 2 \times 5}{3} \right] + 1 = \left[\frac{25}{3} + 1 \right] \approx 9$$

$$= \left[\frac{20 - 15}{3} \right] + 1 = \frac{5}{3} + 1 \approx$$

$$n_W = \left[\frac{20 - 5 + 2 \times 5}{3} \right] + 1 \approx 9$$

$n_C =$ no of filters = 6

The answer is $(9, 9, 6)$.

Q.8

(i)   Approach 1

    input = 10 & output neuronal

    total parameter $= (10 \times 1) + 1 = 10 + 1 = 11$

    Approach 2

    input = 10 & o/p = 2

        $(10 \times 2) + 2 \,(2\ biases) = 22$

(ii)   To make approach 2 same as approach 1, the one neuron always output as 1 and other should give 0.

    $y_1 = 1$; $y_2 = 0$

    → to set this weights can be set a $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

        a matrix of zeros

    and biases be $\begin{bmatrix} -\infty \\ +\infty \end{bmatrix}$

    indicating a large -ve for first bias and a large +ve for y_2

    with this setting approach 2 will act like approach 1.

Q.9

(d) → Conv -17-16

height = 258 - 17 + 1 = 240
width = 258 - 17 + 1 = 240
depth = 16

no of parameters = $(17 \times 17 \times 3 \times 16) + 16$ (from input)
                 = 138 4088

→ For Pool-2 layer,
   max pooling with 2×2 filter & stride of 2

height = 240/2 = 120
width = 240/2 = 120
depth = 16

no of parameters = 0

→ Conv - 11-32
   height = 120 - 11 + 1 = 110
   width = 120 - 11 + 1 = 110
   depth = 32

no of parameters = $(11 \times 11 \times 16 \times 32) + 32$
                 = 61984

→ Pool-2 layer
   no of parameters = 0
   height = 110/2 = 55
   width = 110/2 = 55
   depth = 32

→ ft — 10

$$55 \times 55 \times 32$$

no of parameters $= (55 \times 55 \times 32 \times 10) + 10$

$$= 968010.$$