Q6.1) For input (001)

Step 1:

Multiply input (0,0,1) with the wt's of edges b/w input layer & hidden layer.

Hidden Layer:

neuron #1 input = $0*(5.425528022) + 0*(5.703088771) + 1*(-0.907768267)$

$= \boxed{-0.907768267}$

neuron #1 output on sigmoid func $\frac{1}{1+e^{-x}}$

neuron #1 output = $\frac{1}{1+e^{-(-0.907768267)}} = \boxed{0.287474268}$

neuron #2 input = $0*(7.360087\text{6}) + 0*(-3.0020293) + 1*(-0.18642696)$

$= \boxed{-0.18642696}$

~~neuron #2 output~~

neuron #2 output = $\frac{1}{1+e^{-(-0.18642696)}} = \boxed{0.453527777}$

neuron #3 input = $0*(1.96396178) + 0*(2.34302462) + 1*(1.98738418)$

$= \boxed{1.98738418}$

neuron #3 output = $\frac{1}{1+e^{-1.98738418}} = \boxed{0.879466121}$

neuron #4 input = $0*(-5.1934\text{6}698) + 0*(7.693097\text{7}5) + 1*(1.80612328)$

$= \boxed{1.80612328}$

neuron #4 output = $\frac{1}{1+e^{-1.80612328}} = \boxed{0.858892684}$

Output Layer:

neuron input = $(0.287474268 * 10.32045098) + (0.453527777 * -9.825\,75226) + (0.879466121 * 4.65760254) + (0.858892684 * (-9.83285897))$.

$= \boxed{-5.838554482}$

$$Y(0,0,1) = \frac{1}{1+e^{-(-5.838554482)}} = \boxed{0.00290459}$$

2) For input (0 1 1)

Hidden Layer:

neuron #1 input $= (0 * 5.42528022) + 1 * (5.70308771) + 1 * (-0.90768267)$

$= \boxed{4.79540504}$

neuron #1 output $= \frac{1}{1+e^{-4.79540504}} = \boxed{0.991800144}$

neuron #2 input $= 0 * (7.3600876) + 1 * (-3.00202293) + 1 * (-0.18642696)$

$= \boxed{-3.18845626}$

neuron #2 output $= \frac{1}{1+e^{-(-3.18845626)}} = \boxed{0.039602452}$

neuron #3 input $= 0 * (1.96396178) + 1 * (2.34302462) + 1 * (1.98738418)$

$= \boxed{4.3304088}$

neuron #3 output $= \frac{1}{1+e^{-4.3304088}} = \boxed{0.987008826}$

neuron #4 input $= 0 * (-5.19346698) + 1 * (7.69309775) + 1 * (1.80612328)$

$= \boxed{9.49922103}$

neuron #4 output $= \frac{1}{1+e^{-9.49922103}} = \boxed{0.999925095}$

Output Layer:

neuron input = (0.991800144 * 10.32045098) + (0.039602452 * (-9.82575226)) + (0.987008826 * 4.65760254) + (0.999925095 * (-9.83285897))

= 10.23582477 + (-0.389123882) + 4.597094815 + (-9.832122 44)

= **4.611673263**

$$Y(0,1,1) = \frac{1}{1+e^{-4.611673263}} = \boxed{0.99016256}$$

3) For input (1 0 1)

Hidden Layer:

neuron #1 input = 1 * (5.425528022) + 0 * (5.703087 71) + 1 * (-0.907 68267)

= **4.517 59755**

$$\text{neuron \#1 output} = \frac{1}{1+e^{-4.517 59755}} = \boxed{0.989 20264}$$

neuron #2 input = 1 * (7.3600876) + 0 * (-3.0020293) + 1 * (-0.18642696)

= **7.17366064**

$$\text{neuron \#2 output} = \frac{1}{1+e^{-7.17366064}} = \boxed{0.999 234075}$$

neuron #3 input = 1 * (1.96396178) + 0 * (2.34302462) + 1 * (1.98738418)

= **3.95134596**

$$\text{neuron \#3 output} = \frac{1}{1+e^{-3.95134596}} = \boxed{0.981133968}$$

neuron #4 input = $1*(-5.19346698)+0*(7.69309775)+1*(1.80612328)$

$= \boxed{-3.3873437}$

neuron #4 output = $\frac{1}{1+e^{-(-3.3873437)}} = \boxed{0.032693355}$

Output Layer:

neuron input = $(0.98920264 * 10.32045098) + (0.999234075 * (-9.82575226)) + (0.981133968 * 4.65760254) + (0.032693355 * (-9.83285897))$

$= 10.20901736 - 9.818226471 + 4.569732061 - 0.321469149$

$= \boxed{4.639053801}$

$Y(1,0,1) = \frac{1}{1+e^{-4.639053801}} = \boxed{0.990425713}$

4) For input (1 1 1)

Hidden Layer:

neuron #1 input = $1*(+5.42528022)+1*(5.703087\overline{71})+1*(-0.907682\overline{67})$

$= \boxed{10.22068526}$

neuron #1 output = $\frac{1}{1+e^{-10.22068526}} = \boxed{0.999963592}$

neuron #2 input = $1*(7.3600876)+1*(-3.0020293)+1*(-0.18642696)$

$= \boxed{4.17163134}$

neuron #2 output = $\frac{1}{1+e^{-4.17163134}} = \boxed{0.984807306}$

neuron #3 input = $1*(1.96396178)+1*(2.34302462)+1*(1.98738418)$

$= \boxed{6.29437058}$

neuron #3 output = $\frac{1}{1+e^{-6.29437058}} = \boxed{0.998156732}$

neuron #4 input = $1*(-5.19346698) + 1*(7.69309775) + 1*(1.80612328)$

$= \boxed{4.30575405}$

neuron #4 output $= \dfrac{1}{1+e^{-4.30575405}} = \boxed{0.986688867}$

Output Layer:

neuron input $= (0.999963592 * 10.32045098) + (0.984807306 * (-9.82575226)) + (0.998156732 * 4.65760254) + (0.986688867 * (-9.83285897))$

$= 10.32007523 + (-9.676472613) + 4.64901733 - 9.701972476$

$= \boxed{-4.409352529}$

$$Y(1,1,1) = \frac{1}{1+e^{-(-4.409352529)}} = \boxed{0.0120168888}$$