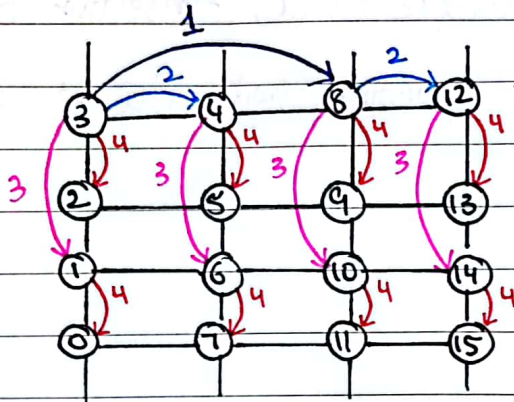


Date 27th April 24

# Assignment-4

Saturday

Q.1



Step 1:

$$3 \rightarrow \frac{16}{2} : 8$$

$$3 \rightarrow 8$$

Step 2:

$$3 \rightarrow \frac{16}{4} : 4$$

$$3 \rightarrow 4$$

Step 3:

$$3 \rightarrow 1$$

$$4 \rightarrow \frac{16}{4} + \frac{16}{8} : 4 + 2 = 6$$

$$8 \rightarrow \frac{16}{2} + \frac{16}{4} : 8 + 4$$

$$12 \rightarrow \frac{16}{2} + \frac{16}{4} + \frac{16}{8} : 8 + 4 + 2 = 14$$

Step 4:

$$8 \rightarrow 12$$

$$8 \rightarrow \frac{16}{2} + \frac{16}{8} = 8 + 2 = 10$$

$$3 \rightarrow 2$$

$$4 \rightarrow \frac{16}{4} + \frac{16}{16} : 4 + 1 = 5$$

$$8 \rightarrow \frac{16}{2} + \frac{16}{16} : 8 + 1 = 9$$

$$12 \rightarrow \frac{16}{2} + \frac{16}{4} + \frac{16}{16} : 8 + 4 + 1 = 13$$

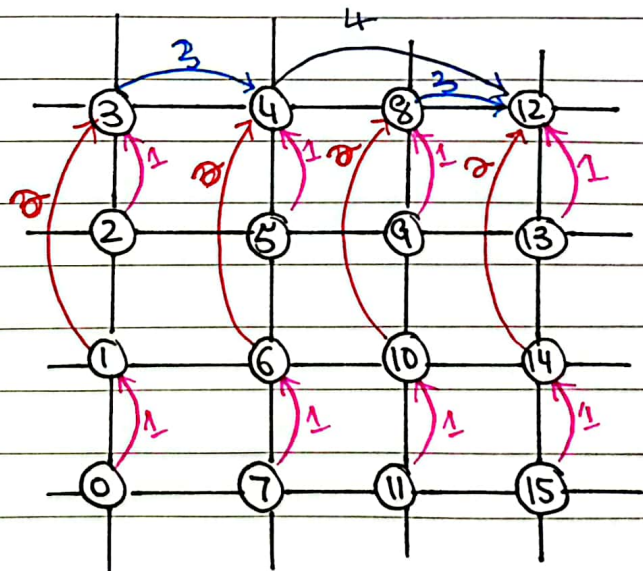
$$1 \rightarrow 0$$

$$6 \rightarrow \frac{16}{4} + \frac{16}{8} + \frac{16}{16} = 7$$

$$10 \rightarrow \frac{16}{2} + \frac{16}{8} + \frac{16}{16} = 8 + 2 + 1 = 11$$

$$14 \rightarrow \frac{16}{2} + \frac{16}{4} + \frac{16}{8} + \frac{16}{16} = 8 + 4 + 2 + 1 = 15$$

Q.1.ii



Date

Q. 1. iii)

$$T = (t_s + m t_w) \log p = 1$$

$$= (2 + 16(0.5)) \log(16)$$

$$= 40s$$

$$t_s = 2s$$

$$t_w = 0.5s$$

$$m = 16 \text{ words}$$

$$p = 16$$

Q. 2

Step 1:

$$3 \rightarrow \frac{8}{2} : 4$$

$$3 \rightarrow 4$$

Step 2:

$$3 \rightarrow 1$$

$$4 \rightarrow \frac{8}{2} + \frac{8}{4} : 4 + 2 = 6$$

Step 3:

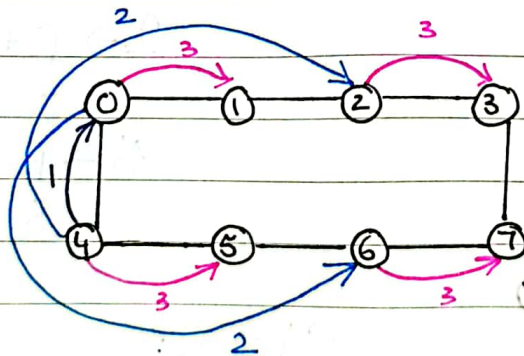
$$4 \rightarrow \frac{8}{2} + \frac{8}{8} = 4 + 1 = 5$$

$$6 \rightarrow \frac{8}{2} + \frac{8}{8} + \frac{8}{4} = 4 + 2 + 1 = 7$$

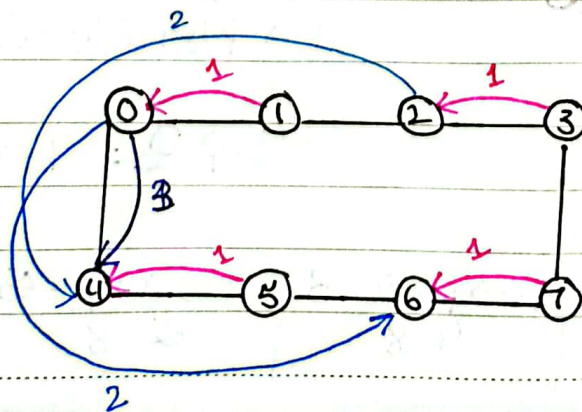
$$3 \rightarrow 2$$

$$1 \rightarrow 0$$

Q. 2. ii)



∴ (One to All Broadcast)



(All to One Reduction)



Date

Q.2.iii

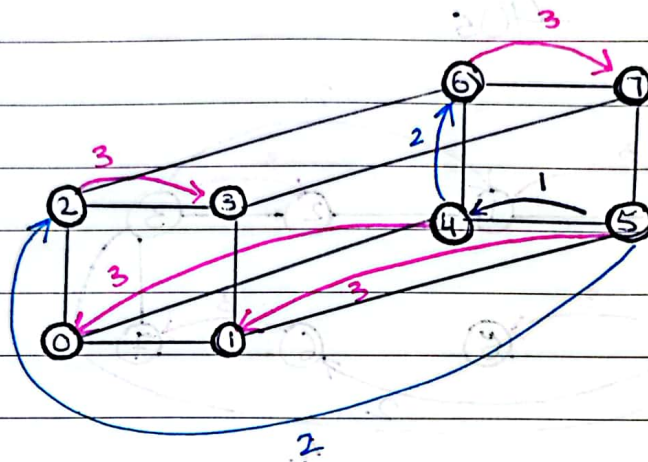
$$T = (t_s + m t_w) \log p$$

$$T = (2 + 8(0.4)) \log_2(8) = 15.6s$$

$$t_s = 2s$$

$$t_w = 0.4s$$

$$m = 8$$



Q.3.i

Step 1:

$$5 \rightarrow \frac{p}{2} = \frac{8}{2} = 4$$

Step 2:

$$4 \rightarrow \frac{p}{2} + \frac{p}{4} = 4 + 2 = 6$$

Step 3:

$$4 \rightarrow \frac{p}{2} + \frac{p}{8} = 4 + 1 = 5$$

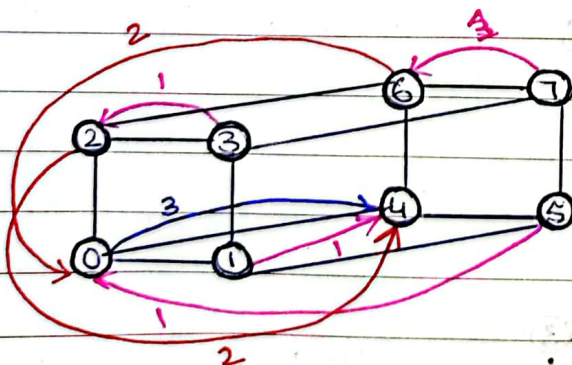
$$5 \rightarrow \frac{p}{4} = 2$$

$$6 \rightarrow \frac{p}{2} + \frac{p}{4} + \frac{p}{8} = 4 + 2 + 1 = 7$$

Q.3.ii

$$2 \rightarrow \frac{p}{4} + \frac{p}{8} = 2 + 1 = 3$$

$$5 \rightarrow \frac{p}{8} = 1$$



Step 2:

$$4 \rightarrow \frac{p}{4} = 2$$

$$0 \rightarrow \frac{p}{2} + \frac{p}{4} = 6$$

Step 3:  $4 \rightarrow \frac{p}{2} = 0$

Step 1:

$$4 \rightarrow \frac{p}{8} = 1 \quad \bigg| \quad 6 \rightarrow \frac{p}{2} + \frac{p}{4} + \frac{p}{8} = 7 \quad \bigg| \quad 2 \rightarrow \frac{p}{4} + \frac{p}{8} = 3 \quad \bigg| \quad 0 \rightarrow \frac{p}{2} + \frac{p}{8} = 5$$

Date

Q.3.iii

$$t_s = 2s$$

$$t_w = 200 \times 10^{-3}$$

$$m = 3$$

$$T = (t_s + mt_w) \log p$$

$$T = (2 + 3(200 \times 10^{-3})) \log_2(8)$$

$$T = 7.8s$$