

Crypt 434 A2 - Part B

①.

$$\begin{array}{r}
 11011 \overline{) 101112+0+0+0+0+0+0} \\
 \underline{\ominus 11011} \\
 1100 \\
 \underline{\ominus 00000} \downarrow \\
 11000 \\
 \underline{\ominus 11011} \\
 11 \\
 \underline{\ominus 00} \downarrow \downarrow \downarrow \\
 11101 \\
 \underline{\ominus 11011} \\
 110 \\
 \underline{\ominus 0000} \downarrow \downarrow \\
 11001 \\
 \underline{\ominus 11011} \downarrow \downarrow \downarrow \\
 10000 \\
 \underline{\ominus 11011} \downarrow \\
 10110 \\
 \underline{\ominus 11011} \\
 1101 \\
 \text{Remainder.}
 \end{array}$$

Checksum = 01101

②.

$$S = d / ps$$

$$t = S + (S / dr)$$

$$sol = 299,792,458 \text{ m/s}$$

i)

$$S = 30 \text{ m} / (299,792,458 \text{ m/s})$$

$$= 1.0 \times 10^{-7} \text{ s}$$

$$t = 1.0 \times 10^{-7} \text{ s} + (1.0 \times 10^3 \text{ b} / 100 \times 10^6 \text{ b/s})$$

$$= 1.0 \times 10^{-7} \text{ s} + 1.0 \times 10^{-5} \text{ s}$$

$$= 1.01 \times 10^{-5} \text{ s}$$

$$S/t = 1.0 \times 10^{-7} \text{ s} / 1.01 \times 10^{-5} \text{ s}$$

$$= 0.0099$$

\therefore CSMA is likely to be more appropriate.

ii)

$$S = 300 \text{ m} / (299,792,458 \text{ m/s})$$

$$= 1.0 \times 10^{-6} \text{ s}$$

$$t = 1.0 \times 10^{-6} \text{ s} + (4.0 \times 10^3 \text{ b} / 10 \times 10^9 \text{ b/s})$$

$$= 1.0 \times 10^{-6} \text{ s} + 4.0 \times 10^{-7} \text{ s}$$

$$= 1.4 \times 10^{-6} \text{ s}$$

$$S/t = 1.0 \times 10^{-6} \text{ s} / 1.4 \times 10^{-6} \text{ s}$$

$$= 0.71$$

\therefore ALOHA is likely to be more appropriate.

3.

a)

| node | a | b | c | d | e | f | g | h |
|------|-----|-----|-----|-----|-----|-----|-----|-----|
| | - | - | - | - | 0 | - | - | - |
| e | - | 8 | - | 2 | (0) | 6 | 2 | - |
| g | - | 8 | 8 | 2 | 0 | 6 | (2) | 3 |
| h | - | 8 | 8 | 2 | 0 | 4 | 2 | (3) |
| f | - | 8 | 8 | 2 | 0 | (4) | 2 | 3 |
| d | - | 4 | 8 | (2) | 0 | 4 | 2 | 3 |
| b | 7 | (4) | 5 | 2 | 0 | 4 | 2 | 3 |
| c | 6 | 4 | (5) | 2 | 0 | 4 | 2 | 3 |
| a | (6) | 4 | 5 | 2 | 0 | 4 | 2 | 3 |
| | 6 | 4 | 5 | 2 | 0 | 4 | 2 | 3 |

b)

| time | $D^a(e)$ | $D^b(e)$ | $D^c(e)$ | $D^d(e)$ | $D^e(e)$ | $D^f(e)$ | $D^g(e)$ | $D^h(e)$ |
|------|----------|----------|----------|----------|----------|----------|----------|----------|
| | - | - | - | - | (0) | - | - | - |
| 1 | - | 8 | - | (2) | 0 | 6 | (2) | - |
| 2 | 11 | (4) | 8 | 2 | 0 | 5 | 2 | (3) |
| 3 | 7 | 4 | (5) | 2 | 0 | (4) | 2 | 3 |
| 4 | (6) | 4 | 5 | 2 | 0 | 4 | 2 | 3 |
| | 6 | 4 | 5 | 2 | 0 | 4 | 2 | 3 |