(a) One method of reducing bandwidth use is to compress the data being transmitted. Let A = {a/20, b/15, c/5, d/15, e/45} be the alphabet and its frequency distribution. Compute the optimal coding for each character. What is the average number of bits/symbol of the codes?

(b) Briefly explain how delta compression works and give an application as example where delta compression is used.

**Answer: Sender transmits complete state snapshot (e.g. current position, health)**

**Following messages only contain changes made since that snapshot. Usually much smaller to send changes in state.**

**Example: MPEG 4**

**MPEG 4 uses I Frames and P Frames for data transmission**

**I Frame contains complete frame information. Usually quite large.**

**P Frame contains changes since last transmitted I Frame. Usually a lot smaller than I Frames.**

**Transmit many more P frames than I frames.**

(c) One method of reducing bandwidth use is to compress the data being transmitted. Use the LZW algorithm to compress the string: BABAABAAA. Note that Uppercase A has ASCII value 65 in decimal. Draw diagrams to aid your explanation if appropriate.

**Answer: 66 65 256 257 65 260**