

## Handwritten

DUE DATE: Thursday 24<sup>th</sup> April 2025

Time: 10am

## Question 1

David is a car racing fan. He records short video clips of races at a local circuit and transfers the clips to his computer for editing. David uses video editing software to join the video clips taken into one continuous video clip.

(a) When he joins the clips together, David uses the *timeline* and *transition* features.

(i) Explain why the timeline feature will be useful for David when he is producing the single continuous clip.

(ii) Name **one** transition David could use.

(b) One of David's video clips plays for 4 minutes. David recorded the clip using 24 bit colour with a resolution of 720,000 pixels per frame at 15 frames per second. Calculate the file size of the uncompressed video. Show all working and express your answer in appropriate units.

(c) David stores some video clips in the MPEG file format. Describe how MPEG achieves compression.

(d) David stores other video clips in the AVI file format. Unlike MPEG, AVI does not allow compression. State **two** reasons why the AVI format might still be a suitable file format for some video clips.

(e) David has old analogue video recordings that he is transferring onto his computer. Describe the roles of the ADC and DSP on the video capture card during the transfer.

## Question 2

The Huffman coding algorithm requires prior statistical knowledge about the information source and such information is often not available. The solution is to use Adaptive Huffman coding algorithm. Let's assume the initial code assignment for both the encoder and decoder as follows.

**Initial Code**

NEW: 0

A: 00011

B: 01010

C: 01011

D: 10100

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For the symbol string BAABDCC,

(a) Please provide the Huffman tree after each step using the Adaptive Huffman coding algorithm.

(b) Please give the sequence of symbols and code (zeros and ones) being sent to the decoder.