

**Q1.**The audio signals on an audio CD are digitally encoded. Part of the audio CD specification describes the encoding as:

'PCM with 16-bit values sampled at 44.1 kHz'.

- (a) Explain why 44.1 kHz is a suitable sampling frequency for high quality audio recording.

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(3)

- (b) Calculate the number of different voltage levels which can be detected in each sample.

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(1)

- (c) The **quantisation error** is the voltage step difference between each level. The peak-to-peak signal voltage is 5 V.

Calculate the quantisation error for an audio CD.

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(2)

- (d) A call centre uses an audio CD to play music to callers while they are waiting for their calls to be answered. The telephone system operates in the frequency range 300 Hz to 3 kHz.

Describe **two** different effects this will have on the quality of the music the callers hear.

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(2)  
(Total 8 marks)