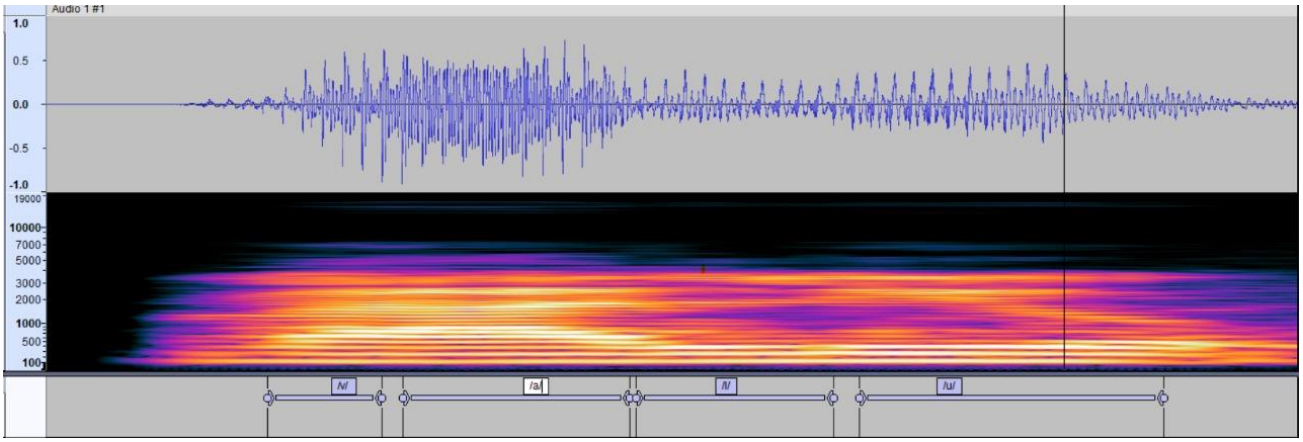
1. Write the vocal track characteristics and excitation characteristics of the phone in the word ‘value’

Vowels	MOA	POA	MOA explanation	POA explanation
/v/ - Voiced Labiodental Fricative	Fricative	Labiodental	The articulators (in this case, the upper teeth and the lower lip) come very close together, creating a narrow constriction in the vocal tract. Airflow is forced through this narrow gap, causing turbulence and producing the fricative sound /v/.	The /v/ sound is produced by bringing the lower lip close to the upper teeth. This is a labiodental place of articulation.
/æ/ - Open-Mid Front Unrounded Vowel	Vowel (specifically, a monophthong)	None (Vowels are characterized by tongue position, not specific places of articulation.)	Explanation: Vowels are produced without significant constriction or turbulence in the vocal tract. In this case, /æ/ is a mid-open front vowel, and it is produced with an open vocal tract and a relatively stable tongue position.	Vowels do not have a specific place of articulation; they are characterized by the position of the tongue within the oral cavity.
/l/ - Alveolar Lateral Approximant	Approximant	Alveolar	The tongue comes into contact with the alveolar ridge but allows some space for airflow to pass along the sides of the tongue, producing the approximant sound /l/.	The /l/ sound is produced with the tongue tip or blade against the alveolar ridge, which is located just behind the upper front teeth. This is an alveolar place of articulation.
/juː/ - Glide (Diphthong)	Glide (semivowel)	Palatal	Glides are produced with a smooth transition of the articulators. The glide /j/ in "value" is a semivowel produced by bringing the tongue close to the palate	The glide /j/ in "value" is produced with the tongue in a position close to the hard

			without creating a significant constriction.	palate, specifically at the palatal place of articulation.

2 & 3) Intuitively draw the waveform and mark different phones in the word 'value'.

Draw Spectrogram intuitively of the word 'value' and explain the regions.



For spectrogram:

Vowels

The formant F1 of /a/ is high compared to formant F1 of /u/. Fricative /v/ have high concentration of energy.

4. two approached for detecting voiced and unvoiced.?

Auto correlation:

Do framing and for each frame do autocorrelation (the sum of products of the signal values at different time instants within the frame). Do peak detection, The presence of peak indicates the periodicity of the signal.

Voiced frames have regularly spaced peaks in the autocorrelation, corresponding to the pitch period. Unvoiced frames do not have peaks.

LP analysis:

LP coefficient estimation.

Use the LP coefficents to predict the signal. The difference between actual and predicted is residual

First coefficient a1 will be higher for voiced compared to unvoiced.

Reference:

Table 2: Consonant classification

Place of articulation	Manner of articulation				Nasals	Semi vowels	Frica-tives
	Unvoiced		Voiced				
	Unaspi-rated	Aspi-rated	Unaspi-rated	Aspi-rated			
Velar	k	kh	g	gh	kn		h
Palatal	ch	chh	j	jh	chn	y	sh
Alveolar	T	Th	D	Dh	Tn	r	shh
Dental	t	th	d	dh	n	l	s
Bilabial	p	ph	b	bh	m	v