Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER II– EXAMINATION – WINTER - 2016

Subject Code: 2720504 **Date: 19/11/ 2016**

Subject Name: Speech Signal Processing

Time: 2:30 pm to 5:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain Speech signal production mechanism with neat sketch.	**07**
	(b)	Explain the classification of phonemes based on manner of articulation by giving its example.	**07**
Q.2	**(a)**	Explain Voice Onset Time in plosive. Draw its figure and explain it.	**07**
	(b)	Explain co-articulation and prosody in detail.	**07**
		OR	
	(b)	Explain effects of different losses in speech wave production.	**07**
Q.3	**(a)**	Define short-time autocorrelation function and explain the pitch detection method using it. Also explain the need of spectrum flattening.	**07**
	(b)	Write and explain the algorithm for end-point detection of a given speech signal using short-time energy and short-time zero crossing rate.	**07**
		OR	
Q.3	**(a)**	Deduce wave equation for lossless tube model with necessary explanation of terms defined.	**07**
	(b)	Explain challenges in pitch detection and list its applications.	**07**
Q.4	**(a)**	Discuss three shortcomings of linear prediction. For each limitation, mention whether or not homomorphic processing can avoid it.	**07**
	(b)	What is application of Linear Predictive Coding? Briefly explain difference between autocorrelation and covariance method of Linear prediction.	**07**
		OR	
Q.4	**(a)**	What is speech coding? Explain need of speech coding. Explain how LPC can be used for speech coding.	**07**
	(b)	Explain difference between Complex Cepstrum of voiced speech and unvoiced speech.	**07**
Q.5	**(a)**	Explain filtering view of short-time Fourier transform.	**07**
	(b)	Show that discrete STFT can be expressed as the outputs of a set of analysis filters. Also Draw its block diagram representation	**07**
		OR	
Q.5	**(a)**	Explain speech signal processing applications.	**07**
	(b)	Derive the equation of Filter Bank Summation (FBS) constraint.	**07**

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