CP5096 SPEECH PROCESSING AND SYNTHESIS

DETAILED SYLLABUS

OBJECTIVES

- To introduce speech production and related parameters of speech.
- To illustrate the concepts of speech signal representations and coding.
- To understand different speech modeling procedures such Markov and their implementation issues.
- To gain knowledge about text analysis and speech synthesis.

UNIT I FUNDAMENTALS OF SPEECH PROCESSING

Introduction– Spoken Language Structure– Phonetics and Phonology– Syllables and Words– Syntax and Semantics – Probability, Statistics and Information Theory – Probability Theory – Estimation Theory – Significance Testing – Information Theory.

UNIT II SPEECH SIGNAL REPRESENTATIONS AND CODING

Overview of Digital Signal Processing – Speech Signal Representations – Short time Fourier Analysis– Acoustic Model of Speech Production – Linear Predictive Coding – Cepstral Processing – Formant, Frequencies – The Role of Pitch – Speech Coding – LPC Coder, CELP, Vocoders.

UNIT III SPEECH RECOGNITION

Hidden Markov Models– Definition – Continuous and Discontinuous HMMs – Practical Issues– Limitations. Acoustic Modeling – Variability in the Speech Signal – Extracting Features – Phonetic Modeling – Adaptive Techniques – Confidence Measures – Other Techniques.

UNIT IV TEXT ANALYSIS

Lexicon – Document Structure Detection – Text Normalization – Linguistic Analysis – Homograph Disambiguation – Morphological Analysis – Letter-to-sound Conversion – Prosody– Generation schematic– Speaking Style– Symbolic Prosody – Duration Assignment– Pitch Generation

UNIT V SPEECH SYNTHESIS

Attributes – Formant Speech Synthesis – Concatenative Speech Synthesis – Prosodic Modification of Speech – Source-filter Models for Prosody Modification – Evaluation of TTS Systems.

REFERENCES

1. Ben Gold and Nelson Morgan, “Speech and Audio Signal Processing, Processing and Perception of Speech and Music”, Wiley- India Edition, 2006
2. Claudio Becchetti and Lucio Prina Ricotti, “Speech Recognition”, John Wiley and Sons, 1999.
3. Daniel Jurafsky and James H Martin, “Speech and Language Processing – An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition”, Pearson Education, 2002.
4. Frederick Jelinek, “Statistical Methods of Speech Recognition”, MIT Press, 1997.
5. Lawrence Rabiner and Biing-Hwang Juang, “Fundamentals of Speech Recognition”, Pearson Education, 2003.
6. Steven W. Smith, “The Scientist and Engineer‟s Guide to Digital Signal Processing”, California Technical Publishing, 1997.
7. Thomas F Quatieri, “Discrete-Time Speech Signal Processing – Principles and Practice”, Pearson Education, 2004.