Subject: Speech Recognition

Lecture	Date	Topics	Hours
	Chapter 1	*Speech and its Types*	3
1	24-07-2022	About speech and speech processing and its application, why speech recognition, aspects of speech, difference between speech and other data, speech sounds, speech processing process, acoustic and articulatory phonetics Lab Work 1: • Analysis of single audio files using librosa • Digitization of speech using speech_recognizer • Human speech production using Google Text to Speech translation Assignment 1: • Speech Analysis of common words	3
	Chapter 2	*Automatic Speech Recognition*	
2	31-07-2022	Acoustic Modelling, Language modelling, HMM, and feature extraction using spectral bandwidth, short term Fourier transform, and MFCC spectral Lab Work 2: • Audio Feature extraction • Spectral analysis Assignment 2: • Spectral analysis on human emotion of happy and sad • Comments on feature extraction for human emotion audios	3
3	07-08-2022	Case Study: Speech Recognition using CNN Lab Work 3: • Building a CNN model to identify emotions from an audio speech Assignment 3: • To design and build a CNN model to identify dysarthria disease	3
	Chapter 3	*Speech to Text*	7
4	14-08-2022*	Speech conversion, Audio segments, Frequency vs Time vs Amplitude, Unsupervised learning in speech data Lab Work 4: • Unsupervised learning in TensorFlow Speech Recognition data on few words Assignment 4: • Build an unsupervised learning model for male and female voices in Hindi	4

5	21-08-2022	Case Study: Detecting Speech Commands Lab Work 5: • Comparative analysis on data science and deep learning on TensorFlow Speech Recognition data Assignment 5: • To build a model for different language words detection	3
	Chapter 4	*Text to Speech*	7
6	28-08-2022	Text normalization, text processing, stemming and lemmatization, n-grams, regular expression, phonetic analysis, and, prosodic analysis Lab Work 6: • Text and Phonetic Analysis on few words Assignment 6: • Sentence Prediction	3
7	04-09-2022	Case Study: Phoneme Classification Lab Work 7: • To classify phoneme of English language Assignment 7: • To classify phoneme through transformers	4
	Chapter 5	*Multilingual Speech and speech translation*	4
8	11-09-2022	About languages and language frequency, Multilingual speech processing, speech to speech translation Lab Work 8: • Multilingual speech analysis on different Indian Languages Assignment 8: • Speech analysis on European Languages	4
	Chapter 6	*Speech Recognition Application and Developments*	8
9	18-09-2022	Spoken Dialog System, Voice XML and SSML Lab Work 9: • Building Personal Voice Assistant using third party libraries Assignment 9: • Voice Chatbots application in different domains	4
10	25-09-2022*	Case Study: Auto Encoders in Speech Recognition Lab Work 10: • Celebrity Speech Recognition Assignment 10: • Auto Encoders using any speech data	4

		Miscellaneous	10
11	02-10-2022	GANs in Speech with simple case study	3
12	09-10-2022	Project Presentation	4
13	16-10-2022	Discussion on recent developments in speech	3

* ICA Test – 20 marks each

Dates are tentative | Assignments: 30 marks

Text Books:

1. Xuedong Huang, Alex Acero and Hsiao-wuen Hon, Spoken Language Processing, Prentice Hall (ISBN 0-13-22616-5).

Reference Books:

1. Jinyu Li (Author), Li Deng (Author), Reinhold Haeb-Umbach (Author), Yifan Gong (Author), Robust Automatic Speech Recognition: A Bridge to Practical Applications,1st Edition
2. Jurafsky Martin, Speech and Language Processing, 2nd edition, 2007