

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

Nov – Dec 2025
Program: B. Tech Scheme IIB
Regular Examination: LY Semester: VII
Course Code: AIDLC7031 and Course Name: Speech Processing
Date of Exam: 27/11/2025
Duration: 02.5 Hours
Max. Marks: 60

Instructions:

- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.

Q. No.	Question	Max. Marks	CO	BT level
Q 1	Solve any two questions out of three: (05 marks each)	10		
a)	Differentiate FIR & IIR filters		CO1	U
b)	Explain Pitch Period Estimation using a Parallel Processing approach with proper example.		CO3	U
c)	Explain Speech recognition using HMM.		CO5	U
Q 2	Solve any two questions out of three: (05 marks each)	10		
a)	Discuss how speech/music discrimination can be used in real-world applications such as automatic radio broadcast monitoring or audio content classification.		CO6	AP
b)	Explain how CELP can be applied to compress voiced and unvoiced speech at a low bit rate.		CO4	AP
c)	Compare wide band and narrowband spectrograms.		CO3	U
Q.3	Solve any two questions out of three. (10 marks each)	20		
a)	Determine 8-point DFT of sequence $x(n) = \{1,1,1,1,0,0,0,0\}$		CO1	Ap
b)	Describe role of various articulators present in speech production.		CO2	U
c)	What is a Weighted Finite State Transducer (WFST)? How would you apply WFSTs to represent and improve the efficiency of HMM-based decoding in an ASR system?		CO5	Ap
Q.4	Solve any two questions out of three. (10 marks each)	20		
a)	What is role of regulatory system in speech production mechanism?		CO2	U

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b)	With related equations explain the terms i) Short time energy ii) Short time average energy and iii) Short time zero crossing rate. How do you distinguish voiced and unvoiced segments based on these parameters?	CO3	U
c)	Differentiate between real cepstrum and complex cepstrum. In which cases is each used in speech processing?	CO4	Ap

Seat No.: