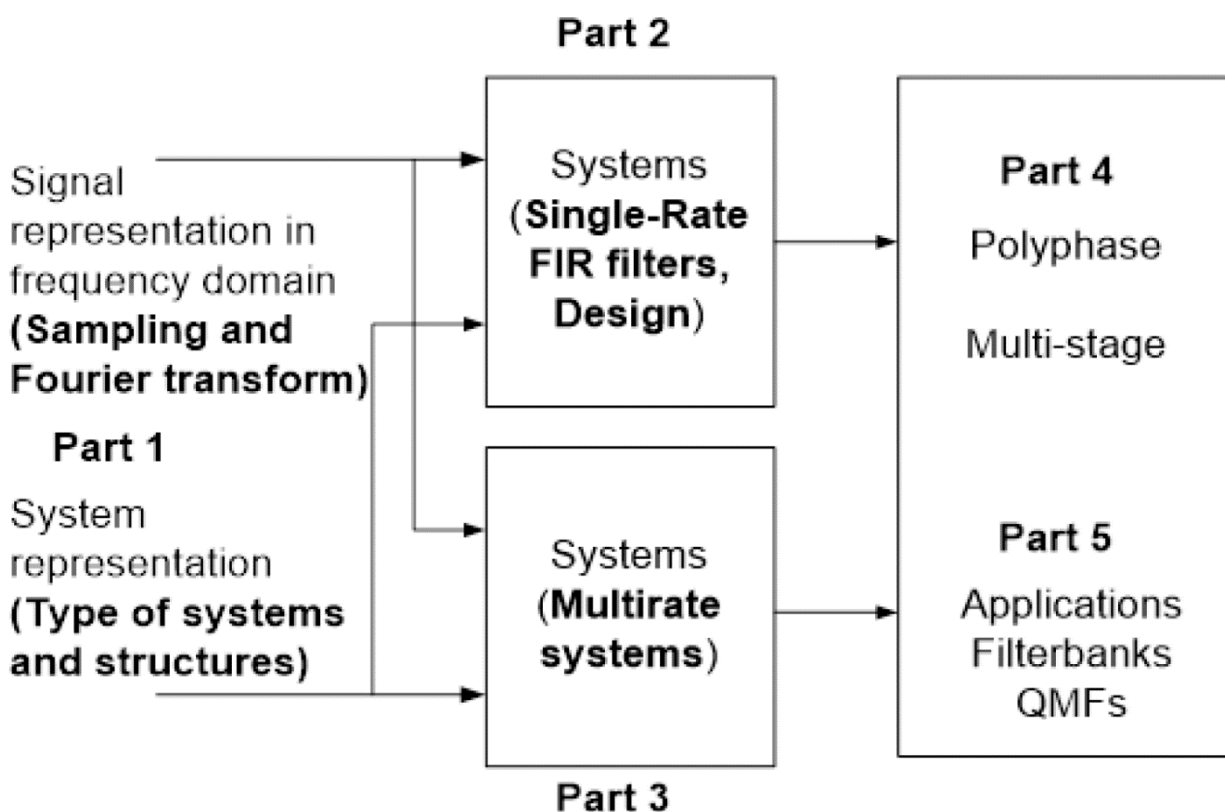


- **Summary**
- **Questions from students**
- **Revision matters**
- **Questions and their solutions**

Relationships among the topics



Part 1: Reviewing the fundamentals of the DSP.

- **Fully appreciate** the sampling theorem, and able to use the aliasing formula. **Without sampling theorem, we do not have DSP.**
- Understand **two** properties (Periodic and Symmetric) of the DTFT to correctly obtain the spectrum of the sampled signals. These two properties have been often used implicitly.
- Able to use the transform pairs of some simple functions, such as delta function and sinusoidal functions.
- No tedious derivation or calculations.
- Able to derive system transfer function from a given block diagram and to analyze the functionality of the system transfer function.
- Able to find the equivalent structures. **Why** do we need equivalent structures?

Part 2: Fundamentals of the DSP systems.

- Understand the differences between ideal and causal filters
- Why there exist ripples and transitional band and how the filter length is linked to the filter specification parameters.
- Know how to **estimate filter order** based on given specifications.

Part 3: Three types of sampling rate conversions.

For each case

- the operations in the time domain
- the spectrums before and after conversion
- why a filter is needed and what are the filter requirements?
- be able to correctly manipulate (plot) the signal spectrum before and after sampling rate conversion.
- Be able to derive the poly-phase structure for each type of conversion from the given requirements by using signal flow graphs.
- Understand how poly-phase filter structure reduces the computational complexity.

Part 4: Multi-stage implementation

- Correctly specify the filters used for each stage
- Estimates the required computational complexity based on the estimated no. of filter coefficients.
- Calculate the required number of multiplications and additions per second.

Part 5:

- Understanding the concepts of the DFT filter bank structure
- Be familiar with the two-channel quadrature mirror filter banks
- Be familiar with the condition of perfect reconstruction of the QMF.
- The details of designing quadrature mirror **filters** are not required.

EE6401 ADSP Assignment 1

- Heavy PENALTY will be enforced for any form of PLAGARISM and CHEATING in your submission of assignments.
- CLEARLY hand-written report is accepted
- Hardcopy are to be sent to S1-B1a-27, part time students may send the softcopy via email.
- Your submission will not be returned, you may keep a copy for checking with solutions

• Online teaching feedback

Exam revisions:

- Fully understand the concepts in the lecture notes and those used in the given questions.
- Look through the exam papers **in the last 2 years**

https://ts.ntu.edu.sg/sites/lib-repository/exam-question-papers/_layouts/15/start.aspx#/Shared%20Documents/Forms/AllItems.aspx?RootFolder=%2Fsites%2Flib%2Drepository%2Fexam%2Dquestion%2Dpapers%2FShared%20Documents%2FPG%2FEEE%2FEE6401%20Advanced%20Digital%20Signal%20Processing&FolderCTID=0x01200089A3F19178D586459D6420D6B5DEE9B1&View=%7BD9CF6ACB%2D25F3%2D4E50%2DA04B%2D39B850D79436%7D

- You may not understand some questions because you are not taught.
- 3 Questions from this part.
- No equations will be given.
- Read questions carefully and try your best to provide the answers.

- **Exam Date and Venue:**

- Date:26 Nov
- Place:??
- On time and being prepared, student card, calculator, warm cloth ...

- **During Exam**

- Read the questions carefully and try your best to answer
- You may ask any questions. Answer will be given if possible.