

1078  
B.E. (Electronics and Communication Engineering)  
Fifth Semester  
EC-502: Digital Signal Processing

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 (Part-A) which is compulsory and selecting two questions each from Part- B.C.

x-x-x

Part A

All questions are compulsory. Each question carries 2 marks.

- Q1. What is Goertzel algorithm?
- Q2. What are the applications of multi rate DSP?
- Q3. What are the properties of chebyshev filter?
- Q4. Explain the term up sampling and down sampling.
- Q5. Define fixed point, floating point and explain the finite word length effects.

Part B

Attempt any 2 questions. Each question carries 10 marks.

- Q6. (A) Explain the properties of the ROC for the z-transform.  
(B) Derive the relation between FT, ZT, DFT.
- Q7. (A) Using DIT-FFT algorithm, find DFT of  $x(n) = \{-j, 1, j+1, 1, 0, 1-j, 0, 0\}$   
(B) Draw and explain the polyphase structure of a decimator.
- Q8. (A) For the following discrete time signals, determine whether the system is linear, shift invariant, causal and stable.  
(i)  $y(n) = x(n+7)$       (ii)  $y(n) = x^3(n)$   
(B) Design of IIR filter using bilinear transformation.

Part C

Attempt any 2 questions. Each question carries 10 marks.

Q9. The desired frequency response of a low pass filter is

$$H_d(e^{jw}) = \begin{cases} 1; & -\frac{\pi}{2} \leq w \leq \frac{\pi}{2} \\ 0; & \frac{\pi}{2} \leq w \leq \pi \end{cases}$$

Determine  $h_d(n)$  for  $M = 7$  using a rectangular window.

- Q 10. Explain the purpose of six registers used in the TMS320C2X processor.
- Q 11. Explain the decimation and interpolation process with an example. Also find the spectrum.

x-x-x