Model Questions For Vth Semester B.Tech Electronics and Communication Engineering.

Digital Signal Processing

PART A

I. Answer any 8 questions. All questions carry 5 Marks.
i) DFT has got inherent periodicity. Why? Explain.
ii) Define DCT and mention the applications.
iii) Briefly explain the applications of FIR filters.
iv) Why digital filter's frequency range is restricted to $-\pi$ to $+\pi$ radians.
v) What you mean by Limit Cycle Oscillations in IIR filters?
vi) What is Warping effect? What can we do for compensating it?
vii) What special function modules are included in DSP processors compared to general-purpose processors.
viii) Explain the features of Shark Processors.

PART B

I.
1) Compute the DFT of the following finite length sequences:
i) $x(n) = \delta(n)$
ii) $x(n) = \delta(n - n_0)$ **[6 Marks]**
2) Derive the DIT FFT algorithm and draw the Signal Flow Graph for an 8 pint DFT.
[9 Marks]

OR

3) Explain how linear convolution between a very long duration sequence and a smaller sequence is practically obtained. **[7 Marks]**
4) What is Wavelet Transform? For what kind of signals Wavelet Transform is suitable? Explain? **[8 Marks]**

II.
1. Design a low pass FIR filter using Fourier series method. The amplitude response

$$A(f) = \begin{cases} 1, & 0 \le f \le 150\,hz \\ 0, & elsewhere \end{cases}$$

The sampling frequency is at 1 kHz and the impulse response is limited to 15 ms. Also determine the system function. **[10 Marks]**
2) What are the advantages of digital filters over analog filters? **[5 Marks]**

OR

3) What is windowing? Explain in detail the concept of window function in the realization of FIR digital filters. **[8 Marks]**
4) Compare FIR and IIR filters. **[7 Marks]**

III.

1) Using Impulse Invariance with T=1sec, determine H(z) if $H(s) = \frac{1}{s^2 + \sqrt{2}s + 1}$. **[7 Marks]**

2) Obtain the Direct form II, Cascade and Parallel form realization for the system y (n) = -0.1 y (n-1) + 0.2 y (n-2) + 3 x(n) + 3.6 x (n-1) + 0.6 x (n-2). **[8 Marks]**

OR

3) Determine the order and the poles of a low pass Butterworth filter that has a -3dB band width of 500 Hz and an attenuation of 40dB at 1000 Hz. **[9 Marks]**

4) Discuss the round off noise in recursive structures with fixed point arithmetic. **[6 Marks]**

IV.

1) Draw and explain the architecture of a typical Shark DSP processor. **[10 Marks]**

2) Discuss the special features available in a typical shark DSP processor. **[5 Marks]**

OR

4) Draw and explain the architecture of TMS320C54X fixed point processor. **[10 Marks]**

5) Briefly explain the Addressing modes and Instruction types of the above fixed point processor. **[5 Marks]**