2/12/2011 BE (ETRX) Sem-VII (OLD)
FTA

ws Sept-2011-165

Con. 6318–11. **(OLD COURSE)** **MP–5824**

(3 Hours) **[Total Marks : 100**

N.B. : 1) Question no 1 is compulsory.
2) Attempt any **four** questions from remaining **six** questions.
3) Figures to right indicate full marks
4) Assume suitable data, if any.

Q1) Attempt the following ; (20)
a) Discuss the design procedure for elliptic filter design.
b) Explain zero-input and over flow limit cycle oscillations due to quantization in digital filter.
c) Compare IIR filter and FIR filter.
d) To design a digital band pass filter, which type of Linear Phase FIR filter can be used? Why?

Q2) a) Design a low pass half-band filter to meet the following specifications:
Pass band edge : 8 KHz
Stop band edge : 16 KHz
Ap = 1 dB, As = 50 dB. Use Kaiser window (10)

b) Convert $H(s) = \frac{4}{(s+1)(s^2+4s+5)}$ to H(z), using impulse invariance, with $t_s = 0.5$ s. (10)

Q3) a) Derive an exact expression for the spectrum of the Blackman window. Using this expression, for $N \gg 1$, show that the main lobe width for the Blackman window is approximately $6W_s / N$. (15)
b) Explain the method of matched Z-transform. (05)

Q4) a) Design a fourth-order Butterworth band pass filter with a 2 dB pass band of 200 Hz and a center frequency of $f_0 = 1$ KHz. (10)
b) What major problem associated with designing of FIR filter using window method and frequency sampling method. How to overcome this problem? (10)

Q5) a) Design a second order digital notch filter having a notch frequency at 60 Hz and a 3 dB notch band width of 6 Hz. The sampling frequency employed is 400 Hz. (10)
b) Design a Chebyshev IIR digital high pass filter with the following specifications: Pass band edge : 700 Hz
Stop band edge : 500 Hz
Pass band ripple : 1 dB
Min. stop band attenuation : 32 dB
Sampling frequency : 2 KHz (10)

Q6) a) Discuss the design procedure of Bessel filters. Obtain 5th order normalized Bessel approximation. (10)
b) Show that the relation between analog frequency and digital frequency in bilinear transformation is given by $\Omega = \frac{2}{T}\tan(\frac{w}{2})$, using relation between 'S' and 'Z' bilinear transformation. (10)

Q7) State true or false and justify the answer : (20)

a) An ant symmetric second order linear phase FIR filter has one possible pole zero diagram whereas symmetric type filter has more than one possibility.

b) The poles of the Butterworth filter lie on a circle whereas the poles of the Chebyshev filter lie on an ellipse.

c) The analog poles will not be aliased by the impulse invariant mapping if they are confined to the S- plane's primary strip.

d) The physically realizable and stable IIR filter can have a linear phase.
