(b) Convert the analog fil o digital filter whose system function is $H(S = \frac{S+0.2}{+0.2)^2+9}$. 8

Use impulse invari technique. Assume T = 1 sec.

8. (a) Discuss in detail about us window functions for FIR filter design. 12

(b) Discuss the effect of fi ecision arithmetic on digital filters. 8

Roll No. .....

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M.E. 1st Semester (Electronics & Communication Engg.) Examination – January, 2016

ADVANCED DIGITAL SIGNAL PROCESSING

Paper : MEEC-507

Time : Three Hours] *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any ***five*** questions. All questions carry equal marks.

1. (a) Discuss the following with suitable examples :

(i) Static and dynamics systems.

(ii) Stable and unstable systems.

(iii) Time variant and time invariant system.

(iv) Linear and non linear systems. 2.5 × 4 = 10

(b) Determine resp f following systems to I/P signal

$x(n) =$ $-3 \le n < 3$ herwise

(i) $y(n) = \frac{1}{3}[x($ $+ x(n) + x(n-1)]$

(ii) $y(n) = \sum_{K=-\infty}^{n} x$ $(n) + (n-1) + x(n-2).....$

10

2. Determine Fourier T: m of following signals :

(i) $x(n) = a^{(n)}, -1 < a$

(ii) $x(n) = \delta(n)$

(iii) $x(n) = \left(\frac{1}{2}\right)^n u(n$

(iv) $x(n) = \begin{cases} 1 & \le 6 \\ 0 & \text{wise} \end{cases}$ $5 \times 4 = 20$

3. Using long division, ine the inverse.

(a) Z transform of $\frac{1+2z^{-1}}{1-2z^{-1}+z^{-2}}$. 10

(b) Explain the signi ; of ROC in Z-transform. 4

(c) State and expl llowing properties of Z-transform.

(i) Time shiftin

(ii) Scaling in z- n 6

4. Determine the DFT of the sequence :

(a) $x(n) = \begin{cases} \frac{1}{4}, & 0 \le n \le 2 \\ 0, & \text{otherwise} \end{cases}$ 10

(b) Discuss various properties of DFT. 10

5. Write short notes on :

(i) DIT FFT algorithm

(ii) Circular Convolution 10, 10

6. Draw the structures of cascade and parallel realisations of :

(a) $H(Z) = \frac{(1-Z^{-1})^3}{\left(1-\frac{1}{2}Z^{-1}\right)\left(1-\frac{1}{8}Z^{-1}\right)}$ 10

(b) $H(Z) = \frac{\frac{Z}{6} + \frac{5}{24} + \frac{5}{24}Z^{-1} + \frac{1}{24}Z^{-2}}{1-\frac{1}{2}Z^{-1}+\frac{1}{4}Z^{-2}}$ 10

7. (a) Discuss the procedure of designing IIR filters using bilinear transformation. What is meant by frequency warping ? 12