

Code: 9A04603

B.Tech IV Year I Semester (R09) Supplementary Examinations June 2017

DIGITAL SIGNAL PROCESSING

(Electrical & Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

- 1 Find frequency domain representation of the sequence $x(n) = 3(0.9)^n u(n)$. Also sketch the sequence, magnitude spectrum and phase spectrum
- 2 Determine the DFT of a sequence $x(n) = \{1, 1, 0, 0\}$ and check the validity of answer by calculating IDFT.
- 3 For the given sequences $x(n)$ and $h(n)$, compute the circular convolution using DIF-FFT algorithm:
 $x(n) = \{1, 1, 1, 1\}$ $h(n) = \{1, 0, 1, 0\}$
- 4 (a) What are filtering elements required to realize digital filter and explain the reasons.
 (b) Realize system with direct form for given:
 $h(n) = \{1, 2, 3, 3, 2, 1\}$
- 5 Determine the $H(z)$ using the Impulse Invariant Method for the analog system function.
 $H(s) = 1/(s + 0.2) (s^2 + 0.1s + 2)$
 Assume $T = 1$ Sec
- 6 An FIR filter has the following impulse response

$$h_d(n) = \begin{cases} 1 & 0 \leq n \leq 6 \\ 0 & \text{otherwise} \end{cases}$$
 Use Hanning window and compute impulse response of the filter. Find its magnitude and phase response and sketch it.
- 7 Discuss the sampling rate conversion with rational factor of M/L .
- 8 Analyze the spectrum of following signal:
 $X[n] = (1/2) \sin(2\pi f_1 n) + \sin(2\pi f_2 n) \quad 0 \leq n \leq N - 1$
 Consider $f_1 = 0.22$, $f_2 = 0.34$ and $N = 16$ and length of DFT is 32. Sketch the obtained spectrum
