

Code No: **R32043****R10****Set No. 1****III B.Tech II Semester Supplementary Examinations, November - 2017****DIGITAL SIGNAL PROCESSING****(Common to Electronics and Communication Engineering and Electronics and Computer Engineering)****Time: 3 hours****Max. Marks: 75****Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) Determine whether the following system is linear, stable, causal and time invariant: $y(n) = nx(n) + x(n+2) + y(n-2)$ [8M]
b) The impulse response of a linear time invariant system is given by $h(n) = 2^{-n}u(n)$. Determine its transfer function and frequency response. [7M]
- 2 a) Find the circular convolution of the following sequences using DFT. $x(n) = \{1,2\}$ and $h(n) = \{-1,1\}$. [8M]
b) Determine the DFT of the sequence $h(n) = \left\{\frac{1}{3}, \frac{2}{3}, \frac{1}{6}, \frac{1}{5}\right\}$. [7M]
- 3 a) Calculate the number of multiplication needed in calculation of DFT using FFT algorithms with 16 point sequence. [3M]
b) Find out the 8-point DFT of $x(n) = \{1,2,3,4,5\}$ using DIT algorithm. [12M]
- 4 a) Discuss the applications of Z-transforms. [5M]
b) Realize the following system equation in direct form-II. $y(n) + 3/4 y(n-1) = x(n) - 2x(n-1)$. [10M]
- 5 Design a Butterworth low pass filter using bilinear transformation method to meet the following specifications: [15M]
Pass band attenuation ≤ 1 dB; Pass band edge=4 KHz; Stop band edge=8 KHz;
Stop band attenuation ≥ 40 dB; Sampling rate=24 kHz.
- 6 a) Compare FIR and IIR filters. [5M]
b) Derive the frequency response of linear phase FIR filters with symmetrical impulse response, for odd order system. [10M]
- 7 Derive the relationship between input and output of a down sampler in Z-domain and Frequency domain. [15M]
- 8 a) Explain Harvard Architecture with a neat diagram. [8M]
b) Explain memory mapped addressing modes used in Programmable DSPs. [7M]

