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]

*****