Department of Computer Systems Engineering
University of Engineering & Technology
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Subject: Digital Signal Processing (5th Semester)

Exam: Mid Term (Fall 2020)

Total Marks: 20

Attempt All Questions. **Time allowed:** **by parts**

Question 2: **(CLO_2)**

1) Determine the response y[n], of the LTI system with impulse response h[n] to the input x[n], where, **(4 Marks)**

$$x[n] = \begin{cases} 2, & -2 \le n \le 2 \\ 0, & otherwise \end{cases}$$

and

$$h[n] = \begin{cases} 3, & -1 \le n \le 2 \\ 0, & otherwise \end{cases}$$

Is the system given by h[n],

(a) Causal or non-causal, and why? **(1 Marks)**
(b) Stable or unstable, and why? **(1 Marks)**

2) What is homogeneous and particular solution of a difference equation? Determine the particular solution of the system described by the following second-order difference equation, **(1+2 Marks)**

$$y[n] = \frac{5}{6}y[n-1] - \frac{1}{6}y[n-2] + x[n]$$

given the input, $x[n] = 2^n u[n]$

3) Draw the block diagram representation for the following difference equation in direct form-I and direct form-II form. **(2+1 Mark)**

$$2y[n] - 3y[n-1] - 4y[n-3] = x[n] + 2x[n-1]$$

Which implementation is better and why?