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

Exam: Final Term (Fall 2020)

Total Marks: 20

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

Question 2:

1) Find the z-transform of the following signals using the **properties of z-transform**. Please state clearly the property used in each step. **(3 Marks)**

a) $x[n] = \frac{1}{5} n \left(\frac{1}{3}\right)^{n-1} u(n-1)$

b) $x[n] = (\frac{1}{2})^n (u[n] - u[n-10])$

2) Find the output y[n] when the signal x[n] is passed through the system with impulse response h[n], using the **convolution property of the z-transform**. **(3 Marks)**

$$x[n] = \{U,T,H,T_h\} \text{ and } h[n] = \{T_h,H,T,U\}$$

Where U, T, H and T_h are the digits at unit, tens, hundredth and thousandth place of your registration numbers, respectively.

3) Use **One-sided Z-transform** to find the response y[n] of the system to the signal x[n], with given initial condition. **(4 Marks)**

$$y[n] = \frac{1}{2} y[n-1] + x[n], \text{ and}$$

$$x[n] = (\frac{1}{3})^n u[n], \qquad y[-1] = 1$$

4) For the following aperiodic signal x[n]; **(4 Marks)**

a) Compute the magnitude and phase spectrum.

b) Sketch its magnitude and phase spectrum.

$$x[n] = \{\ldots,0,1,1,0,1,1,0,1,1,0,1,1 \ldots\}$$