Department of Electrical Engineering
Final Exam Assignment
Date: 28/09/2020

Course Details

Course Title: Digital Signal Processing **Module:** 6th
Instructor: _____ **Total Marks:** 50

Student Details

Name: _____ **Student ID:** _____

Q1.	(a)	Determine the response y(n), n ≥ 0, of the system described by the second order difference equation $$y(n) - 4y(n-1) + 4y(n-2) = x(n) - x(n-1)$$ To the input $x(n) = (-1)^n u(n)$. And the initial conditions are y (-1) = y (-2) = 0.	**Marks 8** **CLO 2**
	(b)	Determine the impulse response and unit step response of the systems described by the difference equation. $$y(n) - 0.7y(n-1) + 0.1y(n-2) = 2x(n) - x(n-2)$$	**Marks 7** **CLO 2**
Q2.	(a)	Determine the causal signal x(n) having the z-transform $$x(z) = \frac{1}{(1-2z^{-1})(1-z^{-1})^2}$$ (Hint: Take inverse z-transform using partial fraction method)	**Marks 8** **CLO 2**
	(b)	Perform the circular convolution of the following two sequences. Solve the problem step by step $$x_1(n) = \left\{\underset{\uparrow}{2}, 1, 2, 1\right\}$$ $$x_2(n) = \{\underset{\uparrow}{1}, 2, 3, 4\}$$	**Marks 7** **CLO 2**
Q.3	(a)	A two- pole low pass filter has the system response	**Marks 12**

		$$H(z) = \frac{b_o}{(1 - pz^{-1})^2}$$ Determine the values of b_o and p such that the frequency response H(ω) satisfies the condition H(0) = 1 and $\left\|H\left(\frac{\pi}{4}\right)\right\|^2 = \frac{1}{2}$.	**CLO 3**
	(b)	Design a two-pole bandpass filter that has the center of its passband at ω = π/2, zero in its frequency response characteristics at ω = 0 and ω = π and its magnitude response in $\frac{1}{\sqrt{2}}$ at ω = 4π/9.	**Marks 8** **CLO 3**