Roll Number:_____ Name:_____

Thapar Institute of Engineering and Technology, Patiala

Department of Electronics and Communication Engineering

END SEMESTER EXAMINATION

B. E. (2nd -Year):	Course Code: UEC404
(ENC & ECE)	Course Name: Signals & Systems
Date: 06-06-2022	Time: 11:15-1:15 PM
Time: 2 Hours, M. Marks: 25	Name of Faculty: Dr. Kulbir Singh, Dr Amit Kumar Kohli, Dr. Sanjay Kumar, Dr. Bharat Garg, Dr. Pravindra Kumar

Note: Attempt all five questions. All questions carry equal marks. Assume missing data, if any, suitably.

Q.1	Determine the z-transform of the following signal $$x[n] = \alpha^n u[n] + \beta^n u[n-1]$$	5
Q.2	Consider $X[z] = \frac{1}{1-az^{-1}}$ with $\|z\| > \|a\|$ Obtain $x[n]$ by using the power-series by long division process. Also determine $x[n]$ for $\|z\| < \|a\|$.	5
Q.3	Let us consider the signal $x[n] = \left(\frac{1}{3}\right)^n sin\left[\frac{\pi}{4}n\right]u[n]$. Obtain the z-transform $X[z]$ of this signal $x[n]$. Draw the pole-zero diagram and ROC for $X[z]$.	5
Q.4	A finite duration sequence of length, L, is given as $$x[n] = \begin{cases} 1 & for \;\; 0 \le n \le L-1 \\ 0 & otherwise \end{cases}$$ Determine the N-point DFT of this sequence for $N \geq L$. Consider $L = 10$ and $N = 100$ for plotting the magnitude and phase of this N-point DFT.	5
Q.5	Plot the following for Radix-2: a) Basic butterfly computation in the decimation-in-time FFT algorithm b) Basic butterfly computation in the decimation-in-frequency FFT algorithm	 2.5 2.5