Reg. No.:

Name :

VIT

Vellore Institute of Technology

Continuous Assessment Test II – March 2022

Programme	: B.Tech. (CSE – AIR)	Semester	: WS 2021-22
Course	: Signal Processing in Robotics	Code	: ECE2036
		Class Nbr	: CH2021225000542
Faculty	: Dr. E. Sathish	Slot	: B2+TB2
Time	: 90 Minutes	Max. Marks	: 50

Answer ALL the questions

Q.No.	Sub. Sec.	Question Description	Marks
1.	a)	A sensor provides a sinusoidal output waveform x(t), whose frequency is unknown and the signal is sampled by an impulse train of period 20 ms. The resulting sample train is applied to an ideal low pass filter with cut-off at 25 Hz. The filter output is seen to be a sinusoidal of frequency 20 Hz. With neat sketches and waveforms, find the frequency of signal before sampling. (12 marks)	[15]
	b)	A signal $x(t)=8\cos 4\pi t$ is sampled at the rate of 24 Hz. Find the range of cut off frequencies for a low pass filter which will be useful for recovering the signal. (3 marks)	
2.		A 3-bit image with 5 × 5 pixels has the intensity distribution as shown below. Enhance the image using histogram equalization technique. Comment on the histogram of the output image. $Input\ image = \begin{bmatrix} 2 & 4 & 3 & 6 & 4 \\ 3 & 4 & 5 & 4 & 3 \\ 3 & 4 & 2 & 5 & 6 \\ 3 & 4 & 5 & 4 & 3 \\ 6 & 2 & 3 & 5 & 4 \end{bmatrix}$	[12]
3.		For the following 8 × 8 grayscale image, compute the fully approximated pyramid and the corresponding prediction residual pyramid. Use a 2 × 2 block neighbourhood median filter for approximation and the pixel replication for interpolation.	[15]